

**African Higher Education Research Online (AHERO): A Model for Sustainable Academic
Research and Development**

<http://ahero.uwc.ac.za>

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Main Theme: Sustainable Development in Africa: The Role of Higher Education

Sub-theme: Research and Development

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Abstract

One mechanism for improving human welfare in developing countries is to expand the amount of essential information that is in the public domain...to expand the knowledge commons¹. The aim of this paper is to highlight open access platforms which offer a sustainable **information environment** for researchers in developing countries. These nations are increasingly investing in improving their communication infrastructure, bandwidth and technology policies to facilitate this process. With the growing knowledge economy, academic research is seen as a critical element of sustainable national development. Adequate access to scientific knowledge enables national research institutes in Africa to find solutions for challenges faced by the developing world.

Unfortunately, scientists and research institutions in Africa can very rarely afford the high costs of knowledge resources. Important information is locked away behind copyright licenses and exorbitant journal subscription fees. The result is an information crisis in which no institution can afford access to a full range of journals. Information flows are blocked by the intellectual hegemony and gate keeping functions of the predominantly Western journals which determine whose articles are to be published. Poor bibliographic control and weak systems of dissemination that lead to poor circulation of research findings further restrict the flow of knowledge; this hinders progress, especially in Africa's least developed countries.

In the face of these chronic problems, many now see great promise and relief in the opportunity to break out of the mould of traditional publication. **Open access** publishing offers universal benefits such as free, permanent online availability of research papers and articles. Research from the South is more visible; publicly funded research achieves more efficient distribution and authors' texts potentially achieve greater impact. Such expansion of knowledge enables developing countries access to crucial information needed to solve challenges.

To this end the paper will introduce an innovative project which grew out of the desire to facilitate the communication of African research literature that is largely inaccessible and undetectable. The [AHERO \(African Higher Education Research Online \)](#) website provides a simple but effective interface for visitors to access full text resources in a niche research area that deals with the practice and development of African higher education. These may be conference papers, research reports, book chapters or journal articles. The functionality of the website will be demonstrated in order to show that authors may deposit papers onto the AHERO site directly from their offices. Our presentation will include a report of methods used to populate the archive, how AHERO deals with copyright and the progress that has been made thus far as well as our achievements. Lastly, the paper will present the results of our user and author evaluation survey after two years of operation.

¹ Juma, Calestous, Improving human welfare: The crucial role of open access *Science Editor*, 29(5): 163-165, 2006

1. Introduction

The concept of “sustainable development” may be used to meet the broader needs of society, in that its definition could be extended beyond environmental concerns to that of enhancing social, economic and political sustainability. All human development is based on the acquisition, spread and use of knowledge. Sustainable growth cannot occur without a strong research base and adequate access to the information domain.

The truth that **knowledge is power** is particularly emphasized in today’s world. Scientific research is the most successful means of knowledge creation. It deals exclusively with information that can be independently confirmed by others, and it therefore requires openness. It thrives on complete and honest public reporting of results. Access to the vast and varied literature that has been generated by scientific research is imperative to the improvement of innovation be it to produce life-saving medicines, or improve farming technology². Information sharing can bring power and profitable returns, hence any sustainable attempt at poverty reduction, good governance, and other economic dilemmas that are a hindrance to sustainable development must address knowledge flows. All nations should have access to scientific knowledge to enable them to strengthen research in their respective countries. It therefore has to be emphasized that research, being an international phenomenon, builds on the reported results of colleagues around the world and contributes to the empowerment of nations and democratic governments. Research data also supplies nations with crucial technical knowledge needed [to] manage the environment and participate in international trade.³

Challenges to information access that are faced by most African countries are high cost of subscription fees, imbalances in the flow of information and poor scientific output.

The purpose of this paper is to introduce an open access platform, AHERO, as a means of lifting barriers to vital scientific data thereby enhancing its visibility and improving human welfare in developing countries. Fundamental issues which will be addressed are:

- a) Access to information in Africa
- b) The Open Access Movement and what it means for Africa
- c) The extent to which the AHERO archive delivers research data to the African Continent

2. Access to information and challenges faced by developing countries

Restriction on access to scientific and health information is hindering progress, particularly in the world’s least-developed countries⁴. Information and knowledge developed in the private sector comes at a price. Financial resources in Africa are limited and these are sorely needed to provide

² Katz et al, 2007, *Common Knowledge: How access to information and ideas can drive development*, *Illuminating Voices*, Panos: London

³ Juma, 2006

⁴ Ibid

exposure to current information. Research information relating to Africa is also found scattered in costly journals and databases, beyond the means of African higher education research institutions. Examples where subscriptions to costly databases have been largely dependent on donors are Sida/SAREC (Swedish International Development Cooperation Agency), Carnegie Corporation of New York, etc.

High cost of subscription fees

Governments spend vast amounts of money on research, yet a large portion of articles that report these research findings are locked in archives, which only give access to paying subscribers.⁵ Journal subscription rates consistently increase every six years⁶ and this has resulted in librarians canceling subscriptions and cutting their book budgets. The result is an **access crisis** in which no institution can afford access to a full range of journals. It has been surmised that this could eventually lead to an increasing marginalisation of science and scientists in the poorer African countries⁷.

Imbalances in information flows and poor scientific output

Sub-Saharan Africa supplied very little contribution towards research output⁸ since 2001 and part of the reasons for this poor reflection is due to the lack of efficient access to scientific publications from developed countries. The South to North flows are blocked by the intellectual hegemony and gate keeping functions of the predominantly Western journals which determine whose articles are to be published. African authors who wish to publish locally face the problem that there are not many African scholarly journals of good quality, and the number is declining. Many are poorly run and edited and appear irregularly, so that libraries in the North do not want to subscribe to them.⁹

South to South flows are obstructed by poor bibliographic control and weak systems of dissemination that lead to poor circulation of research findings in the developing world. It is often overlooked that the South–North flow of information is critical to the South–South flow. This is because much of the knowledge produced in the South is published in the North, and because discipline-wide bibliographic control is also largely based in the North. Since bibliographic control is poorly developed in the countries of the South, we have to rely on

⁵ Nwagwu, Williams and Ahmed, Allam, 2009, Building open access in Africa, *International Journal of Technology Management*; 25(1/2)

⁶ Teferra, Damtew, 2003, Scientific Communication and Research in African Universities : Challenges and Opportunities in the Twenty-First Century

⁷ Nwagwu, Williams and Ahmed, Allam, 2009.

⁸ 0.7%

⁹ Lor, Peter and Britz, Johannes, 2006, Knowledge production from an African perspective: international information flows and intellectual property

bibliographic databases produced in the North. Similarly, resource sharing systems such as inter-library lending (ILL) schemes are poorly developed in African countries.¹⁰

Weak communication and social infrastructure not only block information flows in most Sub-Saharan countries, but ultimately stifle social and economic development.¹¹ It is claimed that these limitations to knowledge create a barrier to the social and economic development of poorer countries and ultimately to the achievement of the United Nations Millennium Development Goals.¹²

3. The Open Access Movement

Open Access is potentially the only way that researchers in developing countries have to reach and be reached by international communities that conduct most of the research and have access to most of the funds. This type of literature is digital, online, free of charge and free of unnecessary copyright and licensing restrictions. This means that research output achieves greater impact and that the progress of science is enhanced. Since Web browsers are neutral, it also means that research from the **South is accessible** and that the full spectrum of both data and perspectives are available.

There are two routes to achieve the above: self –archiving means that after publishing in a journal the author deposits the full text of that article in a web-based OA archive or repository. The other route is to publish your article in an Open Access Journal. Currently there are more than 3400 peer reviewed open access journals, about 12% of the worldwide total of peer-reviewed journals.¹³ A new project, based on the Brazil-based Scientific Electronic Online library (SciELO), aims at providing developing countries with free online access to peer-reviewed academic journals. It aims to “put African research on the map” and has already been successfully implemented in eight countries.¹⁴

The principle of open access belongs to the broader philosophy of **openness and open content**. Members of this broad church of openness are the **Open Source Software movement, the Creative Commons, and the Open Educational Resources community (includes Open Courseware)**. With those licenses, authors grant the public the right to use published work for any legal purpose. Juma, 2006, cites an example whereby African health ministers were licensed to make copies of the first report on a randomized trial of circumcision for HIV prevention and distribute these copies to every health official in their country as well as translate it into local languages. PubMed Central is another open access repository which house full text articles and

¹⁰ ibid

¹¹ Nwagwu, Williams and Ahmed, Allam, 2009.

¹² Katz, 2007

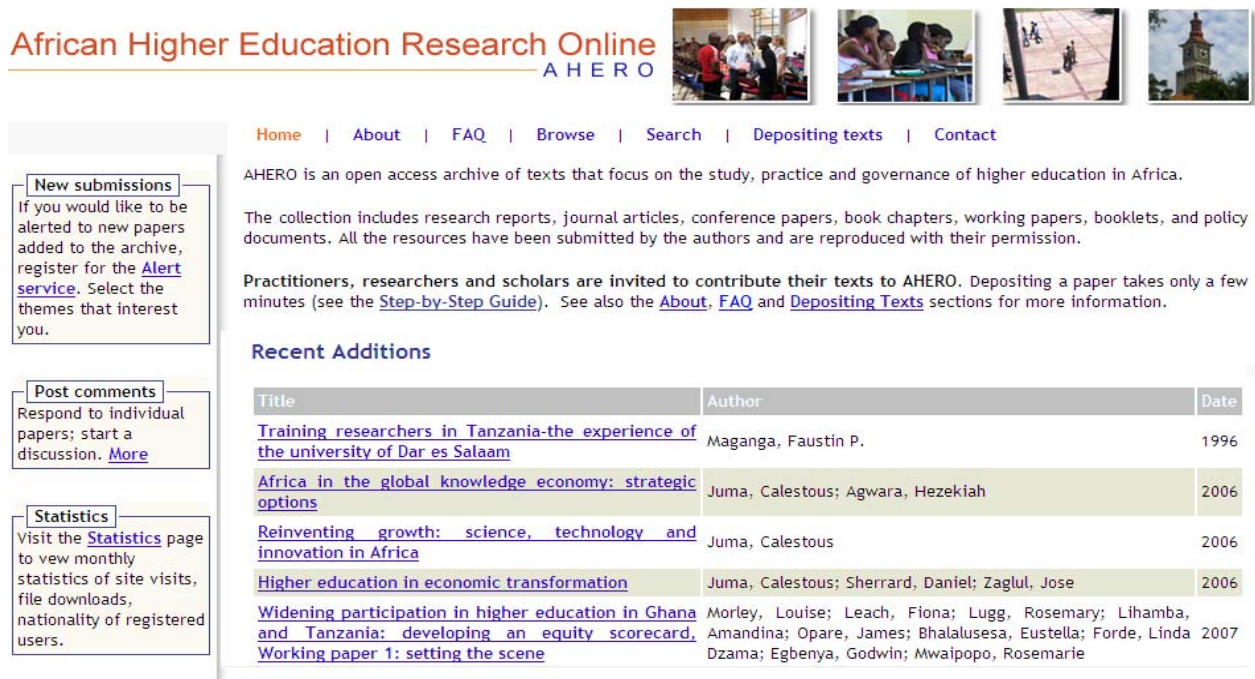
¹³ Suber, Peter, 2009, The Opening of Science and Scholarship

¹⁴ Makoni, M and Scott, C, 2009, South Africa: Top Science Journals to Go Open Access. Accessed on 5 March 2009 at <http://allafrica.com/stories/200903030029.html>

this has “revolutionised life-science research in recent years and has helped to establish new fields, such as proteomics and genomics”.¹⁵

Developing countries would benefit with the capacity to access scientific and medical literature as this would serve to enhance collaboration between developed and developing countries.¹⁶

4. African Higher Education Research Online (AHERO)



African Higher Education Research Online
AHERO

Home | About | FAQ | Browse | Search | Depositing texts | Contact

AHERO is an open access archive of texts that focus on the study, practice and governance of higher education in Africa.

The collection includes research reports, journal articles, conference papers, book chapters, working papers, booklets, and policy documents. All the resources have been submitted by the authors and are reproduced with their permission.

Practitioners, researchers and scholars are invited to contribute their texts to AHERO. Depositing a paper takes only a few minutes (see the [Step-by-Step Guide](#)). See also the [About](#), [FAQ](#) and [Depositing Texts](#) sections for more information.

Recent Additions

Title	Author	Date
Training researchers in Tanzania-the experience of the university of Dar es Salaam	Maganga, Faustin P.	1996
Africa in the global knowledge economy: strategic options	Juma, Calestous; Agwara, Hezekiah	2006
Reinventing growth: science, technology and innovation in Africa	Juma, Calestous	2006
Higher education in economic transformation	Juma, Calestous; Sherrard, Daniel; Zaglul, Jose	2006
Widening participation in higher education in Ghana and Tanzania: developing an equity scorecard, Working paper 1: setting the scene	Morley, Louise; Leach, Fiona; Lugg, Rosemary; Lihamba, Amandina; Opere, James; Bhalalusesa, Eustella; Forde, Linda; Dzama; Egbenya, Godwin; Mwaipopo, Rosemarie	2007

New submissions
If you would like to be alerted to new papers added to the archive, register for the [Alert service](#). Select the themes that interest you.

Post comments
Respond to individual papers; start a discussion. [More](#)

Statistics
Visit the [Statistics](#) page to view monthly statistics of site visits, file downloads, nationality of registered users.

Our project, entitled **African Higher Education Research Online (AHERO)** is one of over 900 interoperable open access archives. It is an international disciplinary repository for research texts that focus on the practice and development of higher education in Africa. Distributed researchers upload their documents to AHERO through a semi-automated process. For the most part, this is intended as a supplementary, post-publication exercise to enhance visibility of research articles, although conference papers, research reports, policy documents and theses are also submitted. AHERO editors vet submissions for relevance, scholarly evidence and coherence, but do not otherwise practice editorial peer review.

¹⁵ Juma, 2006

¹⁶ Juma, 2006

Methodology

Our first task was to identify experts in the field, to obtain their permission to include their work in the online archive and to either digitize or obtain an electronic file of such content. The Centre for Research on Science and Technology (CREST) at the University of Stellenbosch, Cape Town, was commissioned to undertake a search and we were supplied with a database of 1200 individuals who have published books, chapters, journal articles, conference and other occasional papers or research reports about African higher education in the past decade. This served as a constructive instrument for the AHERO project team, providing a starting point from which we began searching for current contact details for the scholars. Thereafter we began contacting the researchers and informing them about the AHERO project. From the second year of the project, we were aided by a project partner based at the East Africa Institute for Higher Education Study and Development, which is located at Makerere University in Uganda.

Besides the subjective qualitative responses that can be offered through our direct daily experience, all correspondence and encounters with prospective authors and publishers was captured in a database. In this way we are able to run queries to discover exact measures with regard to the number of authors contacted, successful deposits in the archive, the types of formats represented, author and publisher responses and the number of embargoed papers. An additional source of information is the responses we have received from presenting the project at a number of conferences and workshops. Following two years' experience of administering AHERO an evaluative survey was initiated. Different questionnaires were sent to two distinct groups, namely, contributing authors, and identified users of the online archive¹⁷. Using data from these various sources, the results of our project are presented below.

Achievements

At a very basic level, it is possible to gauge that we were moderately successful in engaging researchers' receptivity towards open access. Out of 661 overtures to authors, positive responses were achieved from 53% of these (ie, the number of authors in AHERO). To date the archive holds 448 papers; however, it is worth mentioning that it may take weeks or even months before consent is secured for authors, publishers or commissioning bodies. They may only reply after the second or even third reminder. Therefore, securing permission and populating the archive is an iterative and time-consuming process.

It is also significant that only 73 out of 350 authors have self-archived their papers. In all other cases, we have deposited them by proxy and with permission. In response to our invitation, authors attach their files to an email, relying on the AHERO team to deposit on their behalf.

¹⁷ The questionnaires are available online at http://www.cshe.uwc.ac.za/questionnaire/questions_authors.asp and http://www.cshe.uwc.ac.za/questionnaire/questions_users.asp

From the evaluative survey we conducted it transpires that, for many, this is due to lack of confidence with computers. Furthermore, although an open invitation to contribute papers appears on the AHERO homepage, virtually no one will initiate or spontaneously deposit a paper.

Copyright and open access

It is possible that authors continue to feel uncertain about their right to self-archive, particularly where they have assigned copyright to a publisher¹⁸. In such cases, it is necessary to consult the publisher's policy with regard to self-archiving. The British SHERPA-ROMEO project has created an online searchable directory that provides a comprehensive record of publishers' copyright conditions as they relate to authors archiving their work on-line¹⁹. It is interesting to note that although major publishers such as Elsevier will permit authors to self-archive in an institutional repository; this freedom is not extended to a disciplinary repository. However, several publishers will allow the author's version of the post peer-reviewed article to appear on a non-profit site.

Besides journal articles, we were also in direct liaison with publishers for permission to digitize chapters of books or papers from a conference proceedings. Our experience has shown that book publishers, in comparison to the journal publisher would more readily concede to the use of a particular chapter in AHERO.

Where a publisher will not permit a journal article to be reproduced in the AHERO archive, we would embargo the full text but provide on-site functionality for users to request the full text from the author. The usage of this functionality is reported below. Only 37 papers in AHERO are embargoed where we have been unsuccessful in obtaining the author's postprint.

Notwithstanding the difficulties associated with copyright and permissions, another sign of the growth in author awareness of the potential of open access is that the archive is growing steadily at the rate of approximately 25 papers per month. AHERO also accepts unpublished materials such as conference papers, research papers and institutional research. Since authors are the major copyright holders of these types of documents, they are approached for consent. However, the AHERO administrator checks with conference organisers as to the conditions under which conference papers were presented. It may be necessary for permission to be secured from such persons. Alternatively, where papers have been made available via a Creative Commons License, it is not mandatory to obtain permission first before using the research.²⁰ However, the AHERO administrator courteously informs the author that their paper(s) have been deposited in the archive.

¹⁸ Pappalardo, Kylie M et al 2007; A guide to developing open access through your digital repository

¹⁹ <http://www.sherpa.ac.uk/romeo.php>.

²⁰ <http://creativecommons.org/>. A range of Creative Commons licenses permit liberal rights to use and redistribute materials

How do authors respond to invitations to self-archive and share their research findings?

Participants to our evaluative online survey were from 26 different countries with Uganda, South Africa and Kenya furnishing most respondents. The study has informed us about possible improvements, authors and users' overall impression of the archive, usage and frequency of visits.

The author survey²¹ provides a variety of significant information about their research practices. The majority (72%) of respondents were aware that their papers are housed in the archive. The following conclusions could be drawn:

- Authors are generally satisfied with the database records in AHERO associated with their research. Ninety percent of author respondents have expressed acceptance and approval²²
- All author respondents (100%) displayed a willingness to contribute their research in the future ²³

Enhancing the visibility and usage of existing, though “invisible”, Africa-based research

AHERO aims to promote the communication of scholarship as the developing world remains at a disadvantage in terms of both the **production and distribution** of knowledge. African researchers produce only 1.8% of the world's total scholarly publications, according to an article in the journal of *Scientometrics* on the state of science and technology across the continent.²⁴

The key to both of these is the functionality and performance of the AHERO platform. Because it is built according to the Open Archives Initiative (OAI) standards, AHERO is registered with OAIster, and OpenDOAR and EIFL services. This means that the records in our archive are automatically harvested by other service providers and also crawled and indexed by search engines, including Google and Yahoo. In this way papers deposited in AHERO are more readily discovered and used by a global readership. Respondents to our user survey²⁵ were specifically

²¹ Thirty authors participated in the survey

²² One of the positive comments includes “ I noted that you have some good quality research papers and so you are likely to be a first place for my research literature search”

²³ Mohamed, S and Fullard, A, 2009, African Higher Education Research Online: A disciplinary archive

²⁴ Pouris, Anastassios & Pouris, Anthipi, 2007, The state of science and technology in Africa(2000-2004): A scientometric assessment p5

asked how they had first discovered the archive and 50% (15) answered that this transpired by using a search engine such as Google. The remaining users were either guided by a friend or colleague or were introduced to AHERO while visiting the CSHE.

The metadata that we assign to each record also contributes to the overall “findability” of the individual papers in the archive. For example, we enhance the browsability of the archive by assigning both broad subject themes as well as indexing each item in the archive with a set of descriptive keywords. Users may thus navigate amongst papers in the archive by country, by author, by theme or by keyword descriptors.

Through the posting of documents online and the creation of additional access points, the individual papers become more visible. With this increased visibility comes a responsibility to ensure that the papers in the archive are of a high standard. Items which have already been peer-reviewed as part of a publication process are clearly kitemarked with this status. Although the AHERO team does not conduct any form of expert peer review, each paper is vetted and reviewed to ensure a scholarly method has been employed and that it is an original or useful contribution to AHERO.

AHERO provides additional services that we believe serve to facilitate visibility and usage of the papers in the archive. These include the possibility of registering to receive email alerts of newly-deposited papers that coincide with specific research interests and the ability to email the full-text of a paper to a 3rd party.²⁶

To what extent has AHERO content been broadcast and liberated?

Currently, statistics indicate that there have been approximately 25,000 visits to our site and 28% of these visits result in the downloading of files. File downloads are now experienced at a rate of between 50 to 100 each week. More particularly, we are encouraged that visits are recorded from several regions across Africa. To date, AHERO has been visited by 27 African countries. It has to be acknowledged that, owing to inadequate infrastructure in Africa, most African Internet traffic is routed through America, making it difficult to track accurately exactly the destination of downloads from AHERO. Notwithstanding the opacity of some data, where AHERO indicates direct visits from named African countries, we are able to determine a 71% download rate²⁷. This is a significant finding, showing that AHERO resources are indeed needed.²⁸

²⁶ Mohamed, S and Fullard, A, 2009

²⁷ There have been 6261 visits from Africa, 4438 of which have resulted in the downloading of files.

²⁸ Mohamed, S and Fullard, A, 2009

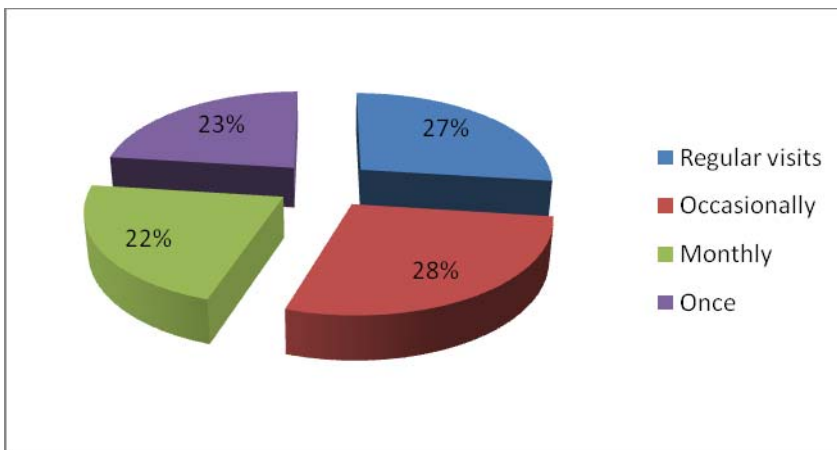
Diagram 6: Visits from Africa



- Represents visits from the African continent to AHERO

Diagram 7: Rate of visitation

Our survey results indicate that 27% of all users and authors replied that they would visit AHERO on a regular basis. 28% visits occasionally; 22% accesses the site monthly and 23% have only visited once.²⁹

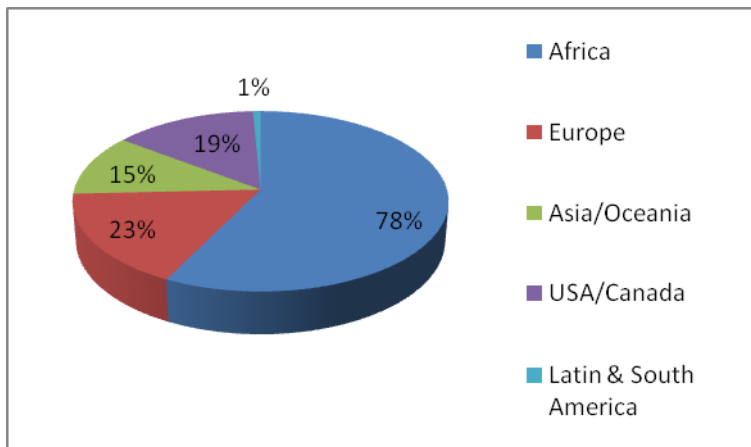


Who is using the site? Because of the way that Internet traffic is routed, with most African visits routed through aol.com (USA), it is difficult to pinpoint accurately where the files are being downloaded, although visits have been registered from 153 countries worldwide. Judging from the e-print requests received, most of the visits are from South Africa and Africa. Approximately 3 e-print requests are processed each week.³⁰ By end November 2008 we had received and processed 269 e-print requests as follows:

Diagram 8: E-Print Requests

²⁹ Ibid

³⁰ Ibid



We believe that through satisfying these e-print requests, AHERO is genuinely able to liberate embargoed texts.

Conclusions and recommendations

Our statistical data show that AHERO is successfully delivering relevant content to African scholars.

Furthermore, the analysis of the online survey is based on a relatively small sample of Africans who, by their very participation in the questionnaire, show an active interest in open access. This is also underscored by the many positive and unsolicited emails we receive which convey much enthusiasm for the project.

It can be deduced that our survey sample is a privileged one, yet it is clear that authors who have contributed material to the archive are satisfied with its display and usage.

The challenge that remains is to evolve AHERO into a self-sustainable digital library. Authors should spontaneously self-archive their research, rather than rely on mediated deposit and repeated invitations. Feedback from the questionnaire as well as our statistics informs us that more advocacy is needed to alleviate these problems. Increased contribution from authors and stakeholder support for open access is essential for dynamic growth of the archive. The experience of AHERO may provide a useful starting point for other disciplinary communities which may wish to consolidate and optimize its scholarship through an open access approach.

From the viewpoint of progress being made in the mainstreaming of open access elsewhere, we are optimistic that open access strategies and initiatives will be placed on the agenda of local research funders and research committees, so that open access achieves more recognition for the academic, social and economic benefits it can bring to the developing world.

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African Higher Education Research Online (AHERO): A Model for Sustainable Academic Research and Development

Conference Paper

Mohamed, Shehaamah and Fullard, Allison, 2009, African Higher Education Research Online (AHERO): A disciplinary archive, Paper to be presented at the African Digital, Scholarship and Curation Conference, Pretoria, South Africa, 12-14 May 2009

Book Chapter

Teferra, Damtew, 2003, Scientific Communication and Research in African Universities : Challenges and Opportunities in the Twenty-First Century