
Promoting Open Scholarship in Africa: Benefits and Best Library Practices

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ABSTRACT

Knowledge, as a prerequisite for development, is contingent on information. The main value of information is in its ability to be used, reused, and shared. Open access (OA) allows for the easy dissemination and preservation of information by providing all scholarly communication and knowledge at no cost to the end user. In the rapidly expanding, global knowledge-based economy, Africa's steady progress from the peripheral to the epicenter of knowledge production is not to be ignored, not least because of its reliance on OA. Such access environments and institutional repositories throughout the continent are playing significant roles in maximizing the impact of research output. This paper reveals that OA content is more citable, not simply because of the quality of the output, but instead of the advantage that OA brings in maximizing accessibility and increased citation. It goes on to show that OA will enhance the research community's existing system for evaluating and rewarding research productivity. Ultimately, OA has the ability to elevate (South) Africa, its universities and institutions, to the status of knowledge producers rather than mere knowledge consumers.

INTRODUCTION

The global knowledge-based economy is in rapid transition, with Africa making laborious attempts to join its ranks. The continent's movement from the periphery of knowledge production to its epicenter, as indicated by Botman (2012), is arduous, given that access to knowledge is a considerable challenge. Nwagwu and Ahmed (2009) point out that information leads to knowledge, and knowledge is a prerequisite for development. Corroborating this assertion is Ola's (2014) contribution, which argues

that knowledge is fundamental to the development of a knowledge society, and the currency for this development is access to information and the capacity to use, reuse, and share it—the core principles of the open access (OA) movement. The movement recognizes that knowledge is an extremely powerful change agent; hence, a lack of access to knowledge in the current knowledge-based world economy effectively relegates a country and a continent to the status of a net consumer of knowledge.

The transition of the global knowledge-based economy in which the production and dissemination of knowledge are viewed as critical for meeting the social and economic needs of nations is foregrounding the role of universities and institutions of higher learning as knowledge producers. As highlighted by Abrahams, Burke, Gray, and Rens (2008), universities and institutions of higher learning in southern Africa are under pressure to increase their research and knowledge output in view of contributing to national developmental goals. Scholarly communication plays a strategic role in disseminating knowledge produced in universities. The equitable medium of dissemination is that open scholarly communication has the inclusionary impact of creating opportunities “for African universities to participate in global knowledge production activities with significant potential gains through, *inter alia*, increased resources for research and publication in local and international academic journals” (p. 23).

This paper examines open scholarship in Africa, with a focus on OA and open education resources. The authors examine the principles of OA and such resources, before applying these principles to the African context. They also explore the significant benefits of OA—namely, improved visibility and accessibility resulting in an increase in downloads and citation counts. Another significant benefit of OA to Africa is its role in stemming the brain drain and contributing to a brain gain. The paper also examines the protection and preservation of local content and making that content available to the global audience. The authors examine, among others, the best library practices for institutional repositories, “gold-route” OA publishing, and support for article-processing charges.

In an effort to identify open scholarship practices in Africa, the authors used South Africa as a case study to establish the best practices and benefits of such scholarship. Because it was likely to provide both causal and meaningful explanations (Marsh, 1982), the survey method was used in this study for both collecting data and analyzing its results. The researchers engaged with all twenty-three South African universities about their institutional repositories through an online survey. Their responses to the survey provided the researchers with sufficient data for filling the gap in the literature on open scholarship in Africa.

THE CLARIFICATION OF CONCEPTS

The concept of *OA* is used to mean any scholarly content that is openly accessible to the end user. However, the concept refers specifically to the *green route* (institutional repositories) and the *gold route*. The broader concept is that of *open scholarship*, which is inclusive of *OA* and open education resources. In the first part of the paper, *OA* is used loosely when referring to the broader concept. Before engaging in further discussion of the pillars of open scholarship, the shift in such scholarship is interrogated, with specific reference to *OA*, from a philanthropic ethos standpoint, then to the “exploitation” of *OA* as a marketing tool.

THE SWING IN THE PENDULUM

The *OA* movement started with a distinct philanthropic agenda, the movement espousing the principle that access to all scholarly communication and knowledge should be made available to all at no cost to the end user (C. A. Parker, 2007). In the view of D’Antoni (2012), at the center of the movement is the simple and powerful idea that the world’s knowledge is a public good, and that technology in general and the World Wide Web in particular provide an extraordinary opportunity for all to share, use, and reuse knowledge.

The impetus for the growth of the movement was a response to the changing publishing landscape, influenced by the spiraling increase in the cost of subscriptions and the concomitant decrease in the capacity of libraries to keep them. This changing environment must be viewed against the backdrop of new digital technologies and ubiquitous communications offering unprecedented opportunities for science and innovation based on open processes. The report by International Council for Science (2014) goes on to claim that *OA* to the scientific literature is a powerful mechanism for creating and validating knowledge, and for supporting the development of science as a public good rather than as an activity conducted behind closed doors.

In responding to the growing state of helplessness by libraries due to spiraling increases in costs for subscriptions to scholarly and scientific journals, librarians started to sound the alarm. Soon thereafter scientists joined in the protest, questioning the existing economic model of journals as the principal means of disseminating scientific communication and information. Koler-Povh, Turk, and Juznic (2012) posit that the most important boost of *OA* was when a number of funding bodies, research councils, and governmental bodies began transforming their views on the publication of the research they were financing. Thus, the *OA* juggernaut began to gain momentum, with most of the relevant stakeholders collaborating for the advancement of science and research and in the process supporting the philanthropic agenda.

However, the organic growth of the *OA* movement has relegated its

philanthropic agenda to another significant outcome: OA has become more attractive for its capacity to improve the visibility of articles, authors, and institutions. Swan (n.d., p. 1) asserts that “authors of academic works enjoy increased visibility, usage and impact of their research outputs when they are made open accessible . . . [and] their institutions benefit from the aggregated usage and impact of their researchers and the increased presence that OA brings.” Corroborating these assertions, Ezema (2013) points out that an increase in the visibility of authors, the promotion of universities’ rankings, and the efficient dissemination of research findings were among the benefits of publishing in institutional repositories. Adding to these views, Cullen and Chawner (2010, p. 133) state that “the primary reasons used to persuade academics of the benefits of placing their output in an institutional repository is exposure—that by having their research and publications openly available on the web, not just in fee-based databases, scholarly journals, or books, their work is likely to be used and cited more. . . . their reputation will be enhanced.”

It is evident from the above that *visibility* has been the carrot for academics to publish their research output via OA platforms. This has inadvertently resulted in the relegation of the philanthropic agenda to another significant outcome, although it has not been lost.

AN EXAMINATION OF OPEN SCHOLARSHIP

The fundamental philosophy of open scholarship is the support for teaching, learning, and research in higher education. Aligned to this trilogy are the three pillars of open scholarship, shown in figure 1. Higher education institutions throughout the world have been using the internet and other digital technologies for decades to develop and distribute teaching and learning materials. These same technologies are used to share research output with the widest possible readership. Open scholarship, according to the Association of Research Libraries (ARL) (n.d.), encompasses OA, open education resources, and all other forms of openness in the scholarly and research environment. The ARL goes on to emphasize that open scholarship is changing how knowledge is both created and shared.

Authors like Corrado (2005) and Hylén (2006) add open source software (OSS) as a critical pillar to open scholarship. As indicated by Wilson and Tchantchaleishvili (2013), OSS is software whose source code is available for modification or enhancement by anyone. Such software includes operating systems, applications, and programs in which the source code is published and made available to the public, allowing copying, modifying, and redistributing without having to pay royalties or fees. Open source products typically evolve through communal cooperation among individual programmers as well as by large companies. An open source license permits anyone in the community to study, change, and distribute the software without charge and for any purpose.



Figure 1. The three pillars of open scholarship.

The second pillar is open education resources, comprising open educational resources (OERs) and massive open online content (MOOC). Tuomi (2006) supports the UNESCO definition of OERs, which states that they are digitized materials offered freely and openly for educators, students, and self-learners to use and reuse for teaching, learning, and research: “The open provision of educational resources, enabled by information and communication technologies (ICTs), for consultation, use and adaptation by a community of users for non-commercial purposes” (p. 31). The principle of *modification and sharing* is strongly supported by UNESCO.

There is very little difference of opinion in the literature on the definition of the third pillar of open scholarship, OA. The generally agreed upon definition of OA is based on the Budapest OA Initiative (2012): the “world-wide electronic distribution of the peer-reviewed journal litera-

ture, completely free and unrestricted access to it by all scientists, scholars, teachers, students, and other curious minds”; “Open Access (OA) is free, immediate, permanent online access to the full text of research articles for anyone, web wide” (Joshi, Vatnal, & Manjunath, 2012, p. 2). The Finch report, cited in Look and Marsh (2012), adds to the definition the ability to download, read, and print electronically published, refereed journal articles, not including research content that is publicly accessible in other formats. The capability of mining text from published content is an additional service. This reuse of content assists researchers by focusing their topic searches on relevant published findings in global research.

Joseph (2012, p. 84) articulates the significant role of OA in strengthening the foundation for research, “emphasizing the most efficient ways to communicate research results and amplifying all of its desired outcomes: accelerating discoveries, fostering innovation, creating new business opportunities, and contributing to the welfare of society as a whole.” The concept of *openness* is based on the principle that knowledge should be disseminated and shared freely via the internet for the benefit of society as a whole. The two most important aspects of openness are free availability and as few restrictions as possible on the use of the resource, whether technical, legal, or cost (Yuan, MacNeill, & Kraan, 2008). The golden thread running through all three pillars is, above all, the commitment and/or support for reuse, adaptation, or modification of content. The principle is to foster and strengthen software, educational resources, and research output. Corroborating this principle, Oracle’s white paper “The Department of Defense (DoD) and Open Source Software” (Baum, 2013) states that open source products are typically evolved through community cooperation and allow anyone in the community to study, change, and distribute the content.

OPEN ACCESS (OA)

As depicted in figure 1, the two sub-pillars of OA are the green and gold routes. The *green route* is generally referred to as the “repositories route” and includes both institutional and subject repositories. In this route, authors engage in the self-archiving of publications. Materials that are ingested into repositories—here, specific reference is made to institutional repositories—include publications like “gray literature” (usually internal and not peer reviewed), peer-reviewed journal publications, and both peer-reviewed and nonreviewed conference proceedings (Joshi et al., 2012). This paper will not interrogate subject repositories. In the *gold route*, authors publish directly in OA journals or those that provide an OA option (also referred to as “hybrid journals”). In this route, authors or their institutions pay a fee (normally referred to as “article publication charges” [APCs], to be discussed below) to publishers for the publication of articles in an OA format. (It must be noted that not all gold routes charge APCs.)

The payment of such fees allows for the author or his/her institution to make the article freely accessible to the end user via the repository.

Institutional Repositories

Raju, Raju, and Smith (2015) assert that institutional repositories were first developed as an online solution for collecting, preserving, and disseminating the scholarship of universities, colleges, and other research institutions. The repository quickly evolved into a platform for libraries to publish and showcase an institution's entire range of scholarly output, including articles, books, theses, dissertations, and journals. Xia (2009) and Jain (2012) claim that since 2000, a number of repository platforms have been developed, each with its own set of benefits and technical criteria.

From the literature, Jain gleans the following benefits of institutional repositories as a result of opening access to research output and data:

- Authors' research has not only immediate exposure but ongoing visibility and usage by others in their respective fields.
- Researchers looking for information will have access to literature from anywhere, not only from their own institutions but from any site that has Wi-Fi access.
- Funding agencies will obtain an increase in return on investment and in visibility.
- Universities and research institutions benefit from enhanced visibility, thus increasing their ability to attract researchers, collaborating, and funding.
- Libraries benefit from increased access to scholarly content for their target audiences.
- Teachers and students gain unrestricted access to material, thus enriching the teaching and learning process. OA nurtures the equality of learning in poor as well as rich nations.
- Science is enhanced and the research cycle accelerated.
- Both citizens and society as a whole will have access to knowledge and to the results of publicly funded research.

The Gold Route

The gold route has two facets: *for profit* and *not for profit*. In the former either authors themselves or their institutions incur APCs; in the latter the costs are minimal (if not nonexistent) because the research is disseminated by a nonprofit organization, and it is here that libraries are starting to play a significant role.

In the for-profit gold route, APCs replace subscription charges and allow publishers to make the full text of every article freely available to all interested parties. Moreover, authors who publish via OA retain the copyright of their work, which is released under a "creative commons attribution license," thus allowing the unrestricted use, distribution, and repro-

duction of original research in any medium provided that it is properly cited. It is generally accepted that OA journals retain the academic rigor associated with traditional publishing. These journals have the following characteristics:

- They are scholarly.
- They utilize quality-control mechanisms like those of conventional journals (for example, editorial oversight and copyediting).
- They are digital.
- They are freely accessible by all.
- They allow authors to retain the copyright of their work.
- They use creative commons attribution licenses, or similar ones.

Academic libraries are starting to play a significant role in supporting the not-for-profit gold route. Raju et al. (2015) assert that libraries are increasingly offering the research community a publishing service to assist authors with disseminating the results of their work. This publishing service is becoming popular. Park and Shim (2011, p. 82) point out that several libraries have recently launched such services to support the dissemination of academic research. R. Parker (2012) shows that Melbourne, Australia's Swinburne University of Technology library publishes three journals edited either by university researchers or with strong university support. The Swinburne library model offers its research community the following publishing services:

- Technical infrastructure using open journals software
- Assistance with search-engine optimization to increase the accessibility of publications
- Assistance with copyright and OA policies and author guidelines
- A digital object identifier (DOI) minting service
- Allocation of ISSNs and ISBNs for one-off monograph editions
- Subscriptions management (where necessary)
- Abstracting and indexing
- Support for engagement with the ERA (Excellence in Research for Australia) process to increase the visibility and prestige of Swinburne's journals

Xia (2009) states that research has found that scholars have a positive attitude toward cooperating with librarians and are willing to take on the responsibility of organizing an editorial process for the quality control of publications. It would seem that the preferred starting point for this transition is to transfer an existing publication from a commercial publishing operation to a jointly managed faculty–librarian publication. In this faculty–librarian relationship, the library provides hosting and other services, such as permanent URLs, workflow streamlining, and the generation of

DOIs. The faculty brings to the table the scholarly component—that is, management of the editorial board, peer reviewing, and acceptance or rejection of the research (Raju, Smith, Talliard, & Gibson, 2012). For the faculty, the benefits of this model of scholarly communication include free access for readers (through libraries' websites), inexpensive hosting (even though libraries have to pay the hosting costs), and convenient management (through collaboration with libraries at the same institution). The ultimate benefit is that the reader has unrestricted access.

OPEN EDUCATION RESOURCES

As with OA, there are two aspects of open education resources: open educational resources (OERs) and massive open online courses (MOOCs). These are detailed below.

Open Educational Resources (OERs)

Hylén (2006) says that the OER is a relatively new phenomenon that must be viewed against the backdrop of the trend toward openness in higher education, including better-known and better-established movements like OSS and OA. The principal issue is that of *openness*, where end users have free access over the internet and there are as few restrictions as possible on the use of the resource. There should be no technical barriers (for example, undisclosed source code), no price barriers (subscriptions, licensing fees, pay-per-view fees), and as few legal-permission barriers as possible (copyright and licensing restrictions) for the end user. The end user should not only be able to use or read the resource but also should also be able to adapt, build on, and thereby reuse it as long as the original creator is credited for the work (Hylén, 2006; UNESCO, 2008; Yuan et al., 2008). This paper emphasizes the principle that the material is meant to be developed through modification, with the ultimate goal of strengthening the educational system.

The Beneficiaries of OERs. OERs help improve education across the globe, especially in developing countries where many students cannot afford to buy textbooks, where access to classrooms may be limited, and where teacher-training programs may be lacking. They are also important in wealthier industrialized countries because they can offer significant cost savings. For students such resources offer free access to some of the world's best courses, and even to degree programs, in addition to huge cost savings from not having to purchase expensive textbooks. For teachers, ministries of education, and governments, OERs provide free and legal access to some of the world's best courses. Educators can then adapt them to local languages and cultures and for use as the basis for innovation. Hylén (2006) asserts that you do not have to be a teacher or student to understand the importance of OERs. Free information is a fundamental human right, and OERs make it possible for people of all ages

and backgrounds to learn more about the world they live in and to access the tools they need to improve their lives and livelihoods.

It is the opinion of the authors of this paper that OERs are the most challenging aspect of open scholarship because academics place the content of their research in an open forum solely for developmental purposes, without any materialistic reward, including the lack of a citation count. This opinion accords with Taylor's (2002), who proposes that the absence of a rewards system should be countered by giving recognition to the creator of a learning resource. Despite the philanthropic underpinning of OERs, it is criticized in its current state of development because of its one-directional flow from the Global North to the Global South. Kanwar, Kodhandaraman, and Umar (2009) go on to state that this presents the danger that a potentially important development is perceived as a manifestation of neocolonialism before it has had a chance to embed itself in Africa and other developing countries.

Massive Open Online Courses (MOOCs)

MOOCs are defined as free, OA, and scalable online higher-education courses. The term was coined in 2008 to describe a particular model of open online courses developed by two Canadian academics, Stephen Downes and George Siemens. The original aim of MOOCs was to open up education and provide free access to university-level courses for as many students as possible. In contrast to traditional university online courses, MOOCs have two key features: *OA* (anyone can participate in online courses cost-free) and *scalability* (the courses are designed to support an indefinite number of participants). The development of MOOCs is rooted in the ideals of openness in education, that knowledge should be shared freely, and that the desire to learn should be satisfied without demographic, economic, and/or geographical constraints (Yuan & Powell, 2013). The promise that MOOCs delivered was free access to cutting-edge courses that could drive down the cost of university-level education, which has encouraged elite universities to offer their courses online by setting up open learning platforms. However, new commercial MOOC startups, such as Coursera and Udacity, charge a fee for certification.

Siemens (2013) states that

the original MOOCs . . . were “open” in two respects. First, they were open enrollment to students outside the hosting university. That is open as in “open registration.” Second, the materials of the course were licensed using Creative Commons licenses so their materials could be remixed and reused by others. That is open as in “open license.”

These dual characteristics of “open” are also core to Open Educational Resources (OER) [*sic*]. . . . An OER cannot be freely available *or* openly licensed—it must be both freely available *and* openly licensed (or in the public domain) to be an OER. (emphasis in original)

He further articulates his concern by stating that the “new cohort of MOOCs are distinct from the original MOOCs in that they are ‘open,’ thus far, in only one respect: they are open enrollment.” New (2014) advances this concern by suggesting, emanating from a study, that many universities use MOOCs as a marketing tool—that is, to increase the visibility of the institution and drive student recruitment.

THE IMPACT OF OPEN ACCESS

Despite the fact that OA originated from a philanthropic ethos, the reality is that scientists seek publication outlets that maximize the chances of their work being read and cited. In the current research-evaluation system, citations are the only public statement of intellectual recognition of the cited author. Davis, Lewenstein, Simon, Booth, and Connolly (2008) argue that citations are an indicator of the dissemination of an article in the scientific community and provide a quantitative system for the public recognition of work by qualified peers. They go on to say that “having work cited is therefore an incentive for scientists, and in many disciplines it forms the basis of a scientist’s evaluation” (n.p.).

Furthermore, in times of cuts to research budgets, the scientific and social impacts of outcomes of research projects have become yardsticks for funding agencies. However, funding agencies and institutions are examining alternative measures to gauge such impacts. Subsequently, the OA environment and institutional repositories are playing a more significant role in maximizing the impact of research outputs (Gargouri et al., 2010). Funding agencies like Wellcome Trust are demanding that researchers make their outputs available in OA and are revising their guidelines to stress the intrinsic merit of the work, and not just the journal in which it is published. Some agencies have, as an eligibility criterion, a commitment that a copy of the research output (that is, the article) be deposited in the author’s institutional repository immediately upon acceptance for publication. Mullen (2008) and Grgić (2011) summarize the rationale for this commitment by pointing out that scientific communication is at the center of the scientific process; communicating research results is an essential part of the process. There is no better way to communicate peer-reviewed scientific results than by making it freely available on the internet.

To return to the benefit for researchers, Terras (2012) is very clear on the issue of improved visibility as a benefit of OA, stating that “if you want people to read your papers, make them OA, and let the community know (via blogs, twitter, etc.) where to get them. [It is] not rocket science” (p. 1). Aligned to this improved visibility is the improved citation count—an incentive for scholars. To demonstrate the synergy between OA and citation counts, Davis et al. (2008) claim that freely available online research generates more than three times the average number of citations received by print articles. The primary explanation offered for this citation advantage

of OA articles is that freely available articles are read more often than their subscription-only counterparts. Corroborating these assertions, Antelman (2004) reports that research findings demonstrate that OA articles have a greater research impact than articles that are not freely available. Bringing the librarian into the discussion, she opines that this finding will reinforce librarians' commitment to the OA agenda, including negotiating rights with publishers. Moreover, librarians, as custodians of institutional repositories, are influencing the development of alternative metrics.

As indicated above, in the current scholarly environment, the journal-level impact is the norm, as opposed to the evaluations of authors of individual articles. It is a given that journal-impact factors correlate poorly with actual citations of individual articles. Therefore, in an environment that promotes the placement of individual articles in repositories, it becomes increasingly important to measure the impact of these articles, hence the demand for new citation measures. OA articles and new citation measures provide this meaningful method of measuring the impact of research. This assertion is supported by Cullen and Chawner (2011), who point out that OA content is more citable, not because of the quality of the output, but instead the advantage it confers in maximizing accessibility and thereby improving citability. They go on to demonstrate, via the research they conducted, that OA enhances the research community's existing system for evaluating and rewarding research productivity. Nicholson (2011) reiterates this assertion by maintaining that OA radically enhances international visibility and accessibility of scholarly works. If works are not accessible, they will not be read; if they are not read, they will not be cited; if they are not cited, the implication is that such works do not have impacts nor scholarly reputations.

In response to the demands to source alternatives to the widely used journal-impact factor and personal-citation indices like the h-index, the OA movement has brought to the fore *altmetrics*. This alternative metric measures article-level impacts; additionally, it measures more than simply citation counts, but also other aspects of the impact of the work like the numbers of data and knowledge bases that refer to it, article views and/or downloads, and recognition in social and news media. The rapid evolution of bibliometrics toward *webometrics*, *cybermetrics*, and *influmetrics* brings new citation-measurement tools to the fore (Raju et al., 2015).

OPEN ACCESS IN AN AFRICAN CONTEXT

Xia (2013) proclaims that scholars in developing countries are more inclined to freely share scholarly materials because of their limited access to subscription-based journals. In the African context, Raju et al. (2015) state that the principles of OA resonate well with the African philosophy of Ubuntu (*Ubuntu* is an ancient African word meaning "humanity to others"; it can also mean "I am what I am because of who we all are") (Mkhize,

2008). The synergy between OA and Ubuntu is underscored by the innate principle of sharing. OA offers African scholars anywhere, anytime access to information and facilitates the active contribution to knowledge production. This opens up a wealth of information to the developing world; more importantly, it makes available the information being generated by the developing world to everyone else. Within Africa itself, however, the sharing of information is difficult because many countries are struggling to develop an infrastructure capable of accomplishing this.

UNESCO (2008, p. 3) emphasizes that “the unimpeded flow of information is one of the prerequisites for the advancement of science and the building of the knowledge societies.” Okeke (2008) adds that the concept of OA to knowledge is based on the global understanding that access to knowledge is a key driver of social, cultural, and economic development and that publicly funded research should be accessed openly. However, its weak infrastructure hinders OA in Africa, thus minimizing the flow of information—fostering, in fact, the one-way Global North–South flow. Furthermore, this diminished access is a significant factor in stifling growth on the continent. To foster a growth trajectory there must be a freer flow of information. Bowdoin (2011) calls for a more equitable distribution of information, and a reversal of the straight Global North–South trajectory in favor of both South–North and South–South flows.

In the opinion of Christian (2008), there has to be a radical improvement in accessibility in order to rectify the imbalance in the flow of information from the Global North to Global South. Search engines like Google and Google Scholar are more likely to be used by African researchers as a way of identifying relevant literature and improving the visibility and concomitant increase in the South-to-South flow of information. Since many scholars in industrialized nations are also becoming frequent users of Google Scholar’s search capabilities, Christian asserts that this may also positively impact on the South to North flow, thereby rendering information from the Global South much more visible.

There is support for the view that the development of institutional repositories will be the catalyst for improved global visibility and utility of the research outputs from academic and research institutions in Africa (Agyen-Gyasi, Corleley, & Frempong, 2010). Furthermore, it is argued that these institutional repositories will introduce a new research culture focused on achieving international standards and values (Agyen-Gyasi et al., 2010; Christian, 2008; Mohammed, 2013; Raju et al., 2015).

From Brain Drain to Brain Gain: The Role of OA

There is significant evidence in the literature confirming that Africa (not excluding South Africa) suffers from an acute case of brain drain to wealthier countries, such as Australia, Canada, the United Kingdom, and the United States, which have strong research infrastructures. Exacerbat-

ing this brain drain is the fact that knowledge generated on the continent is not readily accessible to potential users within it. In the brain-drain process, the physical migration of researchers is regarded as the “hard brain drain,” and the unavailability of research results to users within Africa is the “soft brain drain” (Geber, 2013). The hard-brain-drain factors that attract Africans to other countries include, *inter alia*, a poor research infrastructure, including limited access to scholarly information to support research output (see also Weinberg, 2011; Zhatkanbaeva, Zhatkanbaeva, & Zhatkanbaev, 2012).

The OA movement aids and abets in stemming soft brain drain by providing a conduit that improves the availability and accessibility of African research generated by African scholars through websites and via African universities actively participating in OA practices. The growth of African OA journals is on the rise. The South African research environment is in a strong position to reverse the brain-drain process; it needs to strive to emulate the Indian example, which shows a net inflow of scientists and concomitant outflow of research. The Indians have proven that the productivity of incoming and visiting scientists is higher than that of the average staying and outgoing ones. India has reversed its brain drain and is heading toward a net brain gain. The South African OA strategy has the capacity to showcase the research output of the country, its research niche areas, and its areas of research excellence.

South Africa is ideally placed to develop a roadmap for its own version of a brain gain: it has a growing research infrastructure, the technology to support it, and the raw material/data for new research areas and innovation. The improved visibility of research output, through constructive exploitation of the OA movement, fosters attracting research-collaboration opportunities and high-caliber postgraduate research students. Lucrative funding and grants resulting from this improved visibility of research output, improved collaboration opportunities, and the higher caliber of international postgraduate students will attract research leaders, including both returning South Africans and foreign scientists. This upsurge in South Africa’s research agenda is reliant upon open and free access to scholarly research.

As indicated by Joseph (2012), faster, barrier-free access to scholarly literature will allow users to identify, extract, and incorporate new ideas and data more rapidly into product-development cycles. She reports that “this is already speeding innovation in industries such as biotechnology, where models of openly sharing data are being experimented with in the drug development process, potentially shortening the time from development to market for effective new treatments and therapies” (p. 85). This high-speed translation of ideas into innovative services, products, and other commercial ventures is likely to foster brain gain and hence economic growth in South Africa.

Staying with the theme of *connectedness*, one of the inherent strengths of OA is that it offers a genuine opportunity to democratize access to critical layers of information and open channels for communication and collaboration between/among scholars who previously would never have had the chance to connect. The 2011 study for the Joint Information Systems Committee (JISC) by Parsons, Willis, and Holland also clears the misnomer that scholarly literature is for the higher-education sector only. The study demonstrates the significant benefit of OA to the public sector, flowing from the connection of the public to that critical layer of information that makes it an informed society. OA offers the rank and file of society the opportunity to be active participants in the scholarly and research process. Far from simply enabling interested members of the public to access information anywhere and anytime, OA allows them to actively contribute to the generation of knowledge.

THE PROTECTION AND PRESERVATION OF LOCAL CONTENT

For promotion of the usage of local content and its protection, it is important that there be support from the applicable principals in OA policies. Furthermore, support and guidance from national governments and major funders are imperative because such policies facilitate researchers' publishing in OA systems; they are also important for clarifying objectives, processes, and procedures relating to OA activities. Kaniki and Mphahlele (2002) highlight the need to protect local knowledge by capturing and digitizing it, then making it available to global users. They assert that

knowledge produced by universities and research institutes around the world is gathered, documented and disseminated in a coherent way . . . the same should be done with community-based, local or indigenous knowledge. . . . It should be included, alongside the more usual scientific knowledge, as part of national and international discussions and development and the strengthening of intellectual capacity. (p. 2)

This need to protect local knowledge must be examined within the context of what Bappa (2012) claims to be the vulnerability of African traditional knowledge. He maintains that African local content is being systematically undermined and erased by the invasion of news and information from other cultures, particularly those of the West, which reaches the population through global media. Owusu-Ansah and Mji (2013), writing from an Afrocentric paradigm, highlight the need to promote local content and knowledge; they argue for an emancipatory and participatory type of research system that values and includes local content and knowledge. In the predominantly Western-oriented academic circles and investigations, the African voice is either sidelined or suppressed because local knowledge and methods are often ignored or not regarded seriously. Further, Owusu-Ansah and Mji argue that African-based research must include African thought and ideas from inception through completion and

the implementation of innovation resulting from the research. In this process and contextualization, the research becomes both empowering and meaningful.

This undermining and erasing of local African content must be considered against the backdrop of a collective, traditional culture enriched by multiple customs and languages, each of which having specific ancient knowledge and constituting a source of precious wealth for humanity. Africa's collective culture is enriched by its indigenous peoples and their oral tradition. Given this wealth of local content, the continent must find ways of breaking into the global society and knowledge economy; however, it must accomplish this via its own developmental path. Brewer (2014) asserts that African researchers need to persist in developing and using alternative methods of studying local knowledge and refrain from adhering to the research methodologies established by the West. While Africa neither seeks to negate nor denigrate these Western methods of investigation, its intention is to challenge researchers and African scholars in particular to find alternative methods of inquiry in the investigation and preservation of local content and knowledge for purposes of development and empowerment.

In order to carve out its own path, the continent must ensure that traditional, cultural, and historical knowledge is given top priority in the education system so that its peoples have the identity they need to thrive in the twenty-first century. At the same time, intellectual development in all fields, particularly science and technology, must be pursued and strengthened. The true history of Africa, which has been distorted by those who have exploited it, must be restored. Therefore it is imperative, as emphasized by Pickover and Mohale (2013), that local knowledge be captured, digitized, and disseminated to the widest possible audience. OA is the platform that will ensure this audience. The knowledge made available in this open forum could be either research output on these issues or primary information or digitized data.

In accord with Pickover and Mohale, Mudzaki (2013, p. 4) stresses that "given the dynamic nature of information technologies and obsolescence issues associated with them, it is important to put in place [a] digital preservation strategy." He goes on to say that digital preservation ensures a series of managed activities for continued access to digital materials for as long as necessary, beyond the limits of media failure or technological change. Digital preservation ensures continuity and is, for all intents and purposes, at the end of the OA process. However, it is more important to examine the preceding processes—namely, the capture and digitization of local content; contributions by Africans to history and civilization being captured, curated, disseminated, and preserved. Unfortunately, in the current climate, African history and civilization are conspicuously missing from textbooks and generally remain unknown to other Africans and the

world at large. Owusu-Ansah and Mji (2013, n.p.) confirm this scenario when they claim that “silenced contributions from ancient Egyptian education to philosophy, mathematics, architecture, medicine and library science are just a few” examples of local content that is conspicuously missing from mainstream education. They go on to say that “a quick review of the literature reveals that Africa has historically made a host of contributions to world civilization which remain unknown and subliminally perpetuate the myth that African societies are incapable of rigorous scientific inquiry.”

This conspicuous absence of African content must be viewed against the backdrop of globalization and the technological changes driving new developments in digital publishing and learning. Limb (2005) highlights that the new “scramble for Africa” is for information resources to digitize, which suggests that a new process is unfolding—the digitization of Africa. The challenge for all involved in this digitization of African resources is to ensure access, sustainability, and fairness in their dissemination. According to Limb, OA must be given the priority to achieve the goal of protecting local content, ensuring that it is accessible and thus contribute to world knowledge. Improved access will have the domino effect of increasing usage and its concomitant impact. He further states that scholars and their institutions in the Global North will benefit from the increased access to digitized data about Africa. Improved access, as stated above, will provide long-term solutions to the deep-seated educational and publishing crises in Africa.

Another significant issue in the effort to protect local knowledge is the support from relevant governments. This paper argues that a government-driven process will enhance the visibility and accessibility of research. South African knowledge is in the enviable position, as compared to other countries on the continent, of being supported by the government. There are initiatives (discussed below) by the government of South Africa to support research that addresses local issues, and to share the results of this research with the entire continent, since most other African countries have similar issues. The increase in the visibility of research output will foster the usage of it to address continental problems, thus demonstrating the impact and return on investment of funder-supported research, including research funded by the government.

The Growth of Institutional Repositories in Africa

As indicated by Agyen-Gyasi et al. (2010), *institutional repositories* are regarded as the catalyst for improved global visibility and usage of research output from Africa. Despite the infrastructural challenges, the continent is making significant attempts to increase the number of its institutional repositories for these express purposes. Reviewing the situation, such repositories in Africa have shown relatively substantial growth. South Africa, which leads the continent in research (Nwagwu & Ahmed, 2009; Raju et al., 2012), experienced substantial growth during the period 2008–2010,

after which it leveled off. Regarding the rest of Africa, there has been a relatively significant growth in institutional repositories: from 2013 to 2014 there was a 67 percent increase in the number of repositories. The dominant software for repositories is DSpace, used in more than two-thirds of the total number (103) of repositories. The runner-up software to DSpace is called Greenstone, used in only six repositories. Although most institutions are using open source software, some use propriety software like DigiTool and ContentDM (OpenDOAR, 2014).

In terms of the South African scenario, most of the contents in institutional repositories are theses and dissertations. Stellenbosch University (SU) has taken the lead in best practices by making it mandatory for all graduating students to deposit their theses and dissertations in the repository; even more significant is the university's requirement that only a digital version be submitted, not a hardcopy. This requirement was groundbreaking because it was the first such practice in South Africa and remains unparalleled.

The Gold Route of OA

The second option used to improve global visibility and usage of African research is publishing in *gold* OA journals, or journals that offer an OA option. In terms of the former, libraries are offering a publishing or hosting service. The use of open source software for a publishing service is gaining traction in South Africa, and it is hoped that the rest of the continent will follow this example. The survey that the authors of this paper conducted indicates that four institutions in South Africa are providing a hosting service (or acting as publisher) for the publication of OA journals. The software these four use is Open Journal Systems (OJS) (Raju, Smith, & Gibson, 2013).

A review of the literature shows that South African university libraries were not the first to experiment with OJS. Asamoah-Hassan (2007, pp. 4–5) states that Kwame Nkrumah University of Science and Technology in Ghana took “the plunge into scholarly publishing. It was . . . a welcome development when the PKP software, OJS . . . was introduced to librarians, researchers, journal editors, potential journal editors . . . at a workshop held in Kumasi from 23rd to 24th November 2006.” Despite the comment that the workshop strengthened the library's resolve to enter the field of electronic scholarly publishing, very little was done to convert the activities of the workshop into an active publishing service.

However, it was SU that made a success of the implementation of OJS in Africa. Raju et al. (2012, p. 14), in describing the implementation of OJS at the university, pointed out that “the Library developed an efficient local infrastructure and developed concomitant procedures to support the publication of journals using OJS. . . . Stellenbosch University . . . launched SUNJournals which is the host to the thirteen journal titles.” The library is currently hosting fifteen titles.

In venturing down this road, SU became the first academic institution to formally offer its academic staff members the opportunity to publish their research output using an open source publishing platform. The use of the OJS to publish SU journals is best summarized by a leading researcher at the university, who stated that “local journals that convey critical and relevant research material for the African context will now have exceptional visibility. In fact, the research output in these journals will potentially have greater visibility than any of the leading academic journals” (Raju et al., 2012, p. 15). To extend this best practice, SU applied for the registration of a domain name that was not institution specific. Its domain name for the OJS project is “journals.ac.za,” which supports mobility should the editorial leadership move from one institution to another.

One of the titles hosted by SU is *South African Journal of Libraries and Information Science (SAJLIS)*. To date, the number of articles in SAJLIS is eighty-five, including both digitally born articles and those that have been retrospectively digitized. In less than two years, the articles had a total of 26,887 downloads, with an average of 316 per article. These numbers are surprising because this journal was supposedly limited to a local readership. The 26,887 downloads are distributed among 126 countries, with nearly 56 percent of the downloads being South African. Table 1 lists the top ten countries according to their respective number of downloads.

The increase in downloads from countries other than South Africa demonstrates the increasing visibility and accessibility of the journal. The authors of this paper also interrogated Google Scholar in order to possibly identify a trend with regard to impact and citation count. The citation count since 2009 has increased by almost 88 percent, the authors inferring from this that the large increase in citations is a result of the improved visibility and accessibility of SAJLIS’s full-text content.

Best Practices in Article-Processing Charges

Currently, there are only three institutions in South Africa that support the publishing of articles in OA journals through the payment of APCs. One

Table 1. Percentages of downloads from the top ten countries

Country	% Downloads
South Africa	55.85
India	5.10
USA	4.84
Nigeria	3.79
UK	2.26
Kenya	2.19
Australia	1.30
Tanzania	1.12
Philippines	1.09
Malaysia	1.08

of these is the University of Cape Town (UCT), and the authors highlight it as a best practice for the implementation of APCs. The primary objective of the university's APCs program is to improve the visibility, discoverability, and accessibility of the journal research output of UCT.

There are two significant findings from UCT's APCs program. The first is use of the funds by the humanities faculty. It had always been assumed that the faculty would be a nonparticipant in the program, but some 18 percent of the funds were used to support articles from the humanities faculty. Another finding is the quick turnaround time for downloads and citations. Using actual data supplied by BioMed Central, Raju, Raju, and Johnson (forthcoming) write that UCT's library interrogated the data in an attempt to identify impact and citation trends. It accepted the views of Harnad and Brody (2004) and Koler-Povh et al. (2012) that it takes, from the time an article is accepted for publication (after peer review), an average range of one-to-two years before it can be cited.

The articles that have been supported by UCT's APC program have not yet reached the anticipated level of maturity to generate citations. However, there is evidence of downloads, usage, and citations. Table 2 indicates the number of downloads and citations generated over this short period of time. The fact that an article, published in 2014, has already been cited three times demonstrates the significance of the quick access of full-text content to generate new publications.

OPEN EDUCATIONAL RESOURCES

Currently, UCT is the only institution in South Africa that is actively engaging in OERs. The program is driven by the Center for Educational Technology and solicited funding from national and international sources to provide assistance to academics in converting content into OERs. The assistance centered on navigating open licenses and curating content. The program was also instrumental in developing a network of open "champions"—that is, committed academics whose sharing practices often predated the internet. Moreover, the program was successful in developing a model of sharing scholarly "objects" rather than only modules or coursework (Czerniewicz, Cox, Hodgkinson-Williams, & Willmers, 2014).

Another significant OER project at UCT occurred in the Faculty of Health Sciences when, in 2009, it joined with eight other international

Table 2. Downloads and citations for APC-supported articles

Year	No. of articles	Total no. of downloads	Total no. of citations	Most no. of citations per article	Average no. of citations per article
2012	11	34543	71	17	0.21
2013	19	62272	60	6	0.10
2014	30	36896	9	3	0.02

partners to create the African Health OER Network, cofacilitated by OER Africa and the University of Michigan. The network provides tools for the conversion of teaching resources to OER. The OER health work within UCT continues. Another smaller OER project at UCT was the provision of grants for academics to hire students and/or other expertise for help in converting existing or creating new materials to share as OERs. These small grants, each less than a thousand US dollars, prove to be an effective mechanism for converting resources to open licenses. With sixty-four grants being made in a three-year period, a large number of educators were able to share their teachings with far broader audiences.

One of UCT's most recent initiatives is the "Research into OERs for Development." This initiative, launched in 2013, is hosted by the university's Center for Innovation on Learning and Teaching (CILT). Its goal is "to provide evidence-based research from a number of countries in South America, sub-Saharan Africa, and Southeast Asia with the primary objective of improving educational policy, practice, and research in developing countries by better understanding the use and impact of OER" (Walji, 2014).

CONCLUSION

Open scholarship's three pillars—namely, open source software, OA, and open education resources—has made an enormous contribution to addressing the issue of improved access to scholarly literature. The shift from its original philanthropic agenda to that of an improved visibility agenda has not changed the core goal of improving access to the end user, including the end user in Africa. By the same token, scholarly content produced in Africa is now available to the developed world and being utilized to transition Africa from a net *consumer* of knowledge to a net *producer*. This transition will move Africa from the periphery of knowledge production to its epicenter.

The improved visibility, discoverability, and accessibility of African scholarly content will stem the soft brain drain. The capacity that OA offers in sharing African scholarly content via OA journals and institutional repositories will contribute to converting the drain into a brain gain. OA provides an ideal platform for the capture, preservation, and distribution of Africa's rich cultural content, thus enabling the continent to break through the glass ceiling of the knowledge economy. The best practices by African libraries contribute significantly to maximizing accessibility of African content. The relatively rapid growth of institutional repositories radically improves the visibility and accessibility of African scholarship. The utilization of open source software like OJS to publish local research output facilitates the continent's transition toward "formal" alternative publishing. The commitment to supporting authors to publish in OA journals partners with the OJS to mainstream African scholarship—again, con-

tributing to moving Africa from the periphery to the center of knowledge production. Subscribing to UNESCO's principles of sharing educational resources, the UCT has done excellent work in contributing to enhancing education in the developing world, including Africa. There is ample evidence that the promotion of open scholarship in Africa is transitioning the continent from being a net user of the world's knowledge to a producer of it.

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