

Editorial

Open Access and the Developing World

We live in an unequal world. The developing world is not at all an easy place for conducting research. Researchers in developing countries are disadvantaged in every respect compared with their counterparts in developed countries whether it is training, funds, laboratory facilities, access to information or opportunities for interacting with other experts. As a result, researchers in developing countries have to work harder under difficult conditions to gain recognition and parity among their peers in the developed world.

Take for instance access to research literature. Most new knowledge in the sciences appears in the form of papers in research journals. In the halcyon days of the early part of the twentieth century, there were only a small number of journals and most libraries in the world could afford them. As most of them were published in the West, researchers in the rest of the world had to wait for a few months to receive them by surface mail. Today there are more than 20 000 peer-reviewed professional journals, many of them published by for-profit companies. The subscription charges of most of these journals rise year after year at rates much higher than the general inflation rate. Consequently, most institutions in developing countries are unable to subscribe to even the important core journals. Many university libraries in the US, boasting much higher budgets than those of academic libraries in developing countries, have felt the pinch of the serials crisis.

These financial constraints of subscribing to print copies of journals published by for-profit companies and the advent of the internet have in part fuelled the cry for alternative business models. One model proposes that authors (or their institutions or funding agencies) bear the cost of journals and readers get them at no cost (author-pays open-access). The well-known examples of author-pays open-access journals are *PLoS Biology* and *PLoS Medicine* (published by the Public Library of Science) and the more than 100 journals published by BioMed Central. Incidentally, all the journals published by the Indian Academy of Sciences and the Indian National Science Academy are open-access journals and authors do not have to pay, as the entire cost of publishing is met by the earnings from subscriptions to the print versions and by the publishing institutions, which are not-for-profit organizations.

The advent of the internet and the World Wide Web also opened up another means to do away with the inequality in the field of accessing research information. Imagine that every author makes the full text of his/her papers (preprints or post-prints) available on the internet so that anyone interested in the papers anywhere in the world can access them with a few keystrokes and mouse clicks. That is precisely what Paul Ginsparg aimed at when he created arXiv, a central archive and forum for discussion for physicists, at Los Alamos in 1991. Since its inception, thousands of physicists start their working day with a visit to arXiv. They check for papers of their interest, download them and comment upon them. As all these comments are also in the public domain, they can be read by the author(s) of the papers as well as by others visiting the archive. The authors can improve their papers based on comments received and place an improved version of their papers. Currently owned and operated by Cornell University, arXiv is an e-print service in the fields of physics, mathematics, non-linear science, computer science and quantitative biology. In the words of Ginsparg, 'This resource has been entirely scientist-driven, and is flexible enough either to

coexist with the pre-existing publication system, or to help it evolve to something better, optimized for researcher needs. The arXiv is an example of a service created by a group of specialists for their own use: when researchers or professionals create such services, the results often differ markedly from the services provided by publishers and libraries. It is also important to note that the rapid dissemination it provides is not in the least inconsistent with concurrent or post facto peer review, and in the long run offers a possible framework for a more functional archival structuring of the literature than is provided by current peer review processes.’ A key point is that the cost to archive an article and make it freely available to the entire world in perpetuity is a tiny fraction of the amount to produce the research in the first place. This is, moreover, consistent with public policy goals for what is in large part publicly funded research.

There are similar services for cognitive sciences (Cogprints managed by Stevan Harnad of the University of Southampton), computer and information sciences (CiteSeer, a public specialty search engine and digital library created by researchers at the NEC Research Institute [now NEC Labs], Princeton, New Jersey, USA), and economics (RePEc: Research Papers in Economics [<http://repec.org>], a volunteer-driven initiative to create a public-access database that promotes scholarly communication in economics and related disciplines).

Open Access

The *Budapest Open Access Initiative* defines OA as: ‘There are many degrees and kinds of wider and easier access to this literature. By “open access” to this literature, we mean its free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. The only constraint on reproduction and distribution, and the only role for copyright in this domain, should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited.’

The *Bethesda* and *Berlin* statements put it as: ‘For a work to be OA, the copyright holder must consent in advance to let users “copy, use, distribute, transmit and display the work publicly and to make and distribute derivative works, in any digital medium for any responsible purpose, subject to proper attribution of authorship.”’

Experts such as Stevan Harnad believe that interoperable e-print archives set up by institutions will be better than centralized subject-specific archives. The advantages of Open Access (OA) Archiving (of already published and refereed research papers in interoperable, minimal-cost institutional archives) are:

1. Nothing need change regarding the future of the publishers (because they will continue to publish as before and in parallel with the OA archives—as already proven to be successful in physics through the 14-year-old archive <http://arxiv.org> and the major physics journals. Over 90% of journals have agreed to the institutional archiving of already published papers in OA Archives, including journals published by Elsevier and Nature Publishing.
2. Nothing need change for the authors (because they can continue to publish papers in their favourite journals). However, the impact of their work will be hugely increased if they also archive their full text publications in institutional archives using the free software that allows interoperable searching across all archives. Authors would be wise to publish in one of the majority of journals that agree to OA archiving to benefit from this much increased international impact. OA-compliant archives are now also searchable through the Yahoo and Google search engines.
3. The research output of the authors’ institutes will be greatly enhanced through the establishment of institutional OA archives, showcasing their academic publications. OA archives are set up using free software and there are many support organizations offering help if needed. In India, the Indian Institute of Science was among the first to set up an institutional archive.

4. If institutes are unable to set up their own institutional archives, authors may archive their 'already published' research in any of the established archives (Cogprints, Bioline International, etc.). It does not matter at all where papers are archived, since the archives are all interoperable. However, establishing institutional archives has the advantage of additionally promoting the research output of the institutes.
5. As more and more archives are established, more and more of the world's research becomes internationally accessible for free. Harnad of Cogprints says: 'Archive unto others as you would have them archive unto you.' For institutions in developing countries, sharing their research with countries facing similar research priorities has clear benefits, and making their research 'visible' internationally will lead to many other advantages.

In summary, archiving already published research in interoperable institutional archives greatly benefits global science at almost no cost. This can be done without changing established publishing practices and offers enormous opportunities for scientific and medical research in developing countries. The WHO, Indian Council of Medical Research, Ministry of Science and Technology and the University Grants Commission should consider supporting the setting up of OA archives for medical research publications in India.

The National Institutes of Health, USA and the Joint Information Systems Committee of the UK are trying to implement mandating of OA archiving of publicly funded research in their respective countries. Governments in developing countries will do well to mandate that all publicly funded research is made available through interoperable institutional OA archives. India should lead the way for the rest of the developing world.

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The National Medical Journal of India is now covered
in **Current Contents: Clinical Medicine, Science
Citation Index, SciSearch and Research Alert.**

—Editor