Expanding Access to Published Research: Open Access and Self-Archiving

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Abstract: Academic libraries traditionally provide access to the life science journal literature for their respective institutions by purchasing annual subscriptions to journals. However, with skyrocketing subscription prices and decreased or flattened library budgets, fewer journals are being purchased. This trend results in diminished access to the literature for members of that institution. Open access and self-archiving are possible solutions to this crisis.

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One of the larger problems looming in scholarly publishing today is lack of access to published articles. Readers are irritated at being asked to make a purchase every time they need to read the work of their colleagues. This restricted, costly access to the published literature has a negative impact on scholarly communication and the advancement of science.

Much of the scientific literature remains locked behind subscription prices that not even the wealthiest academic institutions can afford. With staggering prices (Fig. 1) and 6%–12% annual increases, libraries with fixed budgets can no longer afford to purchase the bulk of science journals (1). The current system is unsustainable.

Taxpayer dollars support university facilities, salaries, and federally funded research grants. In the current publishing model, scholars generate ideas, write grants, do the research, put together articles detailing the results of their work, and conduct peer review without remuneration. To have their work seen and cited in prestigious journals, authors sign over copyright control of their work to publishers. This control has given publishers the ability to set unaffordable prices. University libraries then buy back from publishers the very content their scholars have created. Access for universities, scholars, and consumers is entirely dependent upon ability to pay.

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Ultimately this situation interferes with the production of new scientific information. If the library at an academic institution can only afford to purchase a portion of the body of life science journals, a scholar's level of access to research at that institution is severely constrained. Authors move from article to article until one can be found at no cost or send a request to the primary author for a copy. Both of these methods are poor solutions and lead to a decline in readership and citations. Researchers have found that "90% of papers that have been published in academic journals are never cited. Indeed, as many as 50% of papers are never read by anyone other than their authors, referees and journal editors" (2).

OPEN ACCESS PUBLISHING

Publishing in open access (OA) journals and self-archiving are more viable solutions. Some studies have estimated that OA articles are cited 50%–250% more often than non-OA articles (3). The Internet has enabled OA literature to be "digital, online, free of charge, and free of most copyright and licensing restrictions" (4).

Under an OA business model, such as those used by BioMed Central and Public Library of Science, the author, rather than the subscriber, pays the article processing charges which usually range from $500 to $2,500, depending on the journal. This approach provides, among other services, immediate access to the article for any Internet user. The fees cover the costs of "developing and maintaining electronic tools for peer-review, preparing the article in various formats for online publication, securing inclusion in PubMed as soon as possible, securing inclusion of full-text in a number of permanent archives such as PubMed Central and securing inclusion in CrossRef, which enables electronic citation in other journals that are available electronically" (5). This type of publishing and scholarly communication model makes obtaining an article immediate, direct, efficient, and equitable.

DIGITAL REPOSITORIES AND LIBRARIES

Digital repositories and libraries also provide content freely to the world and offer authors the means to

2007 Institutional Prices for Print + Online	
Brain Research	$26,669.00
Journal of Comparative Neurology	$24,552.00
European Journal of Pharmacology	$14,019.00
Gene	$13,226.00
American Journal of Medical Genetics	$12,771.00
Journal of Neuroscience Research	$11,182.00

FIG. 1. 2007 institutional prices for print plus online journals. Journal subscriptions for academic libraries increase an average of 6%–12% per year (Source: University of Utah Libraries).

self-archive. The National Library of Medicine created PubMed Central (6) as a digital repository to facilitate free access to National Institutes of Health (NIH)–funded life science research. Other digital repositories include the National Science Digital Library (NSDL) (7), Health Education Assets Library (HEAL) (8), eSciDoc (9), and other subject and institutional repositories such as arXiv.org (10), Neuro-Ophthalmology Virtual Education Library (NOVEL) (11), and DSpace at MIT (12). These systems aim to provide current quality, peer-reviewed, and open scientific content via the Web. Furthermore, these systems intend to go beyond the provision of traditionally published, text-based research articles to provide access to intellectual content such as oral presentations, images, Web pages, audio, video, and interactive media. These resources can be hyperlinked, making it quite easy for a researcher to discover and navigate to additional and relevant research.

SELF-ARCHIVING

A broad range of research materials are becoming freely available from a desktop by simply using a search

FIG 2. Options for self-archiving. Self-archiving ensures open access to an author's work. Authors can archive in subject repositories such as PubMed Central or Neuro-Ophthalmology Virtual Education Library (NOVEL) or in institutional repositories. To find out if your institution has a repository, search *Open* DOAR.

engine such as Google Scholar. There are many ways for authors and users to propel this new development. The simplest method, called self-archiving, allows researchers to deposit a copy of their final peer-reviewed manuscript into their institution's digital repository (Fig. 2), an act that "takes a few minutes and costs a scientist nothing…at a stroke, by self-archiving, a scientist can banish the threat of that bane of scientific life—obscurity" (13).

Researchers can also retain key portions of their copyright so that they may post publishers' versions of articles in repositories or on departmental Web sites. A balanced approach, as promulgated by the group Scholarly Publishing and Academic Resources Coalition (SPARC), involves having publishers retain nonexclusive rights to publish and make financial gains and for authors to retain their rights to reprint and make derivative works. Authors may promote this approach by using an addendum to the original transfer agreement. SPARC provides such a document (14).

It is, of course, naive to think that authors will stop publishing in prestigious journals that facilitate promotion and tenure simply for the sake of enhancing access for others. Many young scholars and researchers consider that they have much to lose in terms of career advancement by pushing for change at pivotal points in their careers. Some university departments recognize this concern and have begun addressing the standard retention, promotion, and tenure process by initiating a debate about what constitutes a "published" paper (15). The appropriate process of peer review is also under review. There are some who believe that because most university faculty provide peer review at no cost to the publisher, there ought to be a new system in which scholars and researchers interact more directly (yet anonymously) via digital scientific communities such as arXiv.org rather than through traditional publishing hierarchies.

In our networked and digital environment, a lot remains at stake for scholarly communication. Scientists and scholars can advance their research by publishing and/or self-archiving in dynamic, interoperable, efficient, and open systems to deliver the results of life science research to all who wish to read it.

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