
OPEN ACCESS PUBLISHING: A Solution to the Serials Crisis?

The steep rise in subscriptions costs to scientific publications and the potential of the internet have resulted in an argument that all scientific research results should be available for free. Danny Kingsley examines how such a system would work.

Most scientific research is funded through the public purse, but the results of that research – in the form of scientific articles published in peer-reviewed journals – is usually only accessible if a fee is paid either as a subscription or a society membership.

For many years a small group of activists have rallied against the taxpayer “paying twice” for research. With widespread uptake of the internet there is now a strong movement arguing that all peer-reviewed scientific research should be “open access” and freely available at the time of publication.

The scientific system is underpinned by scientific publishing. Researchers write up their results into an article and submit it to a journal that is relevant to their field. The editor ensures that the article is appropriate for the journal and sends it out to other experts who are working in the same field for checking. This process is called peer-review and, while it is not perfect, it safeguards that published articles are accurate and can be relied upon.

Scientific journals are generally

published by commercial publishers or by professional associations such as the Australian Medical Association. Each academic speciality has its own journal, and some have several. In total there are a huge number of journals published annually worldwide – one source estimates 24,000 of all types of disciplines. This adds up to a total of 2.5 million articles published each year!

Publishing an article in a peer-reviewed journal fulfils several roles. It acts as a way of notifying other researchers in the discipline of recent findings, and also gives priority to the researcher who publishes first. Publication allows the scientific community to work as a group by building on each other’s work.

Journal subscriptions are expensive, and becoming more expensive each year. A few researchers hold individual subscriptions, but researchers working in institutions have access to journals through their libraries.

Over the past 15 years or so, library budgets have remained fairly static, increasing on average by 4% per year (in line with the consumer price index).

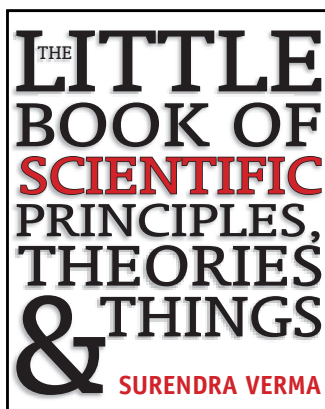
Yet between 1986 and 2002, the price of all journal subscriptions rose by 227%, with physical science journals rising by 615% between 1984 and 2001.

Because they rely on what is published before them, academics need to be able to read all the papers that are relevant to their work. However, the increased costs of subscriptions is forcing libraries to reduce their lists of journals. This gap between the journals that academics want access to and what libraries can afford is called the “serials crisis”.

Open Movement

By 1991 the possibilities of the internet were starting to be felt by the academic community. Since then a group of people have advocated that electronic publishing is a solution to the serials crisis. While an early suggestion that scientists self-publish journals never really took off, there has been a growing group of advocates who argue that the internet can be used to open up research.

In 1995 the World Wide Web was adopted almost universally as a portal to



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the internet, and publishers began electronic publication alongside their printed publications. Many commercial journals now publish exclusively electronically.

It is this electronic publication that has raised the possibility of “open access” publishing. Open access publishing is loosely defined as free electronic access to peer-reviewed articles at the time of publication. The emphasis is on the free distribution of scientific knowledge.

A seminal moment in the movement was the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities in October 2003. Since then, in addition to several other declarations, petitions and threatened boycotts, actual progress has been made towards increasing access to scientific literature.

Australia is seen as a progressive country in this debate. In 2003 the federal Department of Education, Science and Training distributed \$12 million in grants to “increase Australia’s research accessibility” with several projects that specifically address open access.

Overseas, the movement has intensified in the past 6 months. In both the US and the UK, several funding bodies have insisted that from October 2005 any articles published as a result of

research conducted with their money must have open access publication.

Open access publishing offers many benefits to academics. Researchers can read all the available literature in their field, not just what their library can afford. This is particularly relevant to researchers working in poor and developing countries. Open access articles are considerably more frequently cited than those that are held behind subscriptions.

There are two generally accepted ways that open access can be achieved.

- The “gold road” to open access is by switching current journals to open access, publishing articles online and for free. *The Medical Journal of Australia* is an example of an open access journal.
- The “green road” to open access is where authors of articles can post a copy of their article on their web page when it is published in a peer-reviewed journal.

Both of these options have experienced difficulties in their implementation.

Open Access Journals

Under these open access options, who pays the unavoidable costs of producing finished articles for publication? While the elimination of paper publication does reduce the price of publishing

there remains the costs of coordinating the peer review process, editing, layout and designing pages, maintaining the websites and electronic archives, and keeping track of subscriptions.

There are currently two main business models for open access journals. The first is for learned societies to use their membership fees to pay for the publication of their journals. The Australian Medical Association uses this model to publish the *Medical Journal of Australia*. But for some societies, a free subscription to the journal is the main benefit of being a member, and societies are concerned that if they make their journals free, the members won’t pay their membership fees anymore.

The second business model is usually referred to as “author pays”. This is an inaccurate name, because usually it is the author’s institution or the funding body that would pay the publication fee. It is sometimes called “pay on acceptance”. In this instance, the publisher charges an amount for each paper published. Depending on the journal this amount ranges from US\$500–1500.

BioMed Central (BMC) is a large commercial organisation in the UK that publishes more than 140 open access journals in biology and medicine. While BMC charges a pay-on-acceptance fee, the company has brokered a deal where all higher education staff in the UK and those working for the National Health Service can publish in a BMC journal without charge to the individual author.

So are people taking up these open access publishing opportunities? Not really. According to the *Directory of Open Access Journals* only about 7% of all journals are open access, so the reality is that most researchers will not have an open access journal in their discipline to submit their work to even if they wanted to. However, the number of open access journals is increasing rapidly, so this situation may change significantly over the next few years.

As well as letting others know of recent research, a journal article can

act as a career tool. When a researcher uses work that has been previously published, he or she will cite that work by listing it in the bibliography of their paper. The number of papers and subsequent citations an individual scientist has contributed to his or her professional standing and can help with promotions and job applications.

And it isn't just how many articles an individual has published that counts, it also matters where articles have been published. A paper published in a high profile journal, such as *Science* or *Nature*, is valued much more than one published in a small biannual local journal. So even if there is a relevant open access journal and the author can find the funds to pay the fee, it is highly possible authors will not submit to open access journals because they lack status.

Digital Repositories

It is precisely this issue that has many people advocating the green road to open access. This is the self-posting of an article onto the internet at the time it is published in a peer-reviewed journal. Under this model, the current publishing systems remain – articles are still sent to journals and peer-reviewed before being published. Many institutions have set up “institutional repositories” – a sort of digital library that holds articles and other digital items and has special search engine capabilities so the contents can be “harvested” when search engine spiders come crawling through the site.

One problem with self-depositing is that most academics are highly specialised in their field, but that doesn't necessarily include the administration of an institutional website. According to surveys looking into this issue, while some academics think they don't possess the skills to self-deposit, others simply feel they shouldn't have to.

As a result of poor metadata tagging, search engines currently only find a small percentage of the total number of relevant web pages in a search. Often

items buried deep inside a university web portal are never retrieved from departmental or individual websites. The use of properly managed repositories overcomes these problems.

Using a repository also eliminates the issue of journal status – the articles are still published in peer-reviewed journals so they still have the same status as before.

Even so, the uptake of this open access option has been low – only 15% of the 25 million articles published each year are placed in a repository. The reasons the uptake has been so low are complex.

For a start there aren't very many digital repositories. In October 2005 there were 469 institutional archives in existence at 7276 universities in the world, so approximately 6% of all universities have institutional repositories. This means 94% don't.

The issue of copyright is one of the most fraught in this debate. Traditionally, authors who sent an article to a journal for publication would assign their copyright to the publisher. This would mean that it would be a breach of copyright for authors to post a copy of their own paper onto a website without specific permission.

Over the past few years a large majority of publishers have given the “green light” to self-posting of articles. Twenty-three per cent of publishers allow the author to self-post their preprint, which is the version of the paper they send to a journal. Another 70% of publishers allow the self-posting of a post-print – the edited version of the article that ends up being published. While this sounds impressive, people involved in the administration of institutional repositories are still finding they must check the copyright status of every single article that is posted.

While open access articles are cited more because they have higher exposure, this might not be much of an incentive for a researcher to self-deposit his or her own work. Most academics are

not doing their research for self-promotion or personal gain. What matters to them is that they are respected by a certain number of people in their field.

However, the people who run and manage universities do get excited by increased citation numbers. It is these people who have pushed the “publish or perish” line – that if you do not get yourself published you will be out of a job – because publication and citation counts are also very important when it comes to university league tables. The higher up one of these tables a university is, the more funding it receives and the greater number of fee-paying overseas students it can attract.

These opposing perspectives represent one of the problems being faced by institutions trying to fill up their repositories. A potential solution is for the institution to mandate that all articles published by employees of the institution are placed in the repository. To date only a handful of places worldwide have taken that step, with Queensland University of Technology one of the few.

An Open Access Future?

Publishing articles in journals has been the accepted method of distributing scientific knowledge for more than 300 years, and any change to that system will need to be embraced by the many players in the scientific communication game. Note that this is simply one of repeated attempts over the past few centuries to deal with burgeoning information and increased costs.

It remains to be seen whether the road to open access is coloured gold or green, or a further model is developed. What can be said about this latest push to change the system is it has seen substantial support at both a government and institution level.

If ever there was an opportunity to look forward into change, this is it.

Danny Kingsley is a PhD student at the Centre for Public Awareness at the Australian National University, where she is looking at the worldwide trend towards open access to scientific publications.