

Why Open Access for Brazil?

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Abstract This paper defines Open Access and describes how it works. It reviews the reasons why Brazilian researchers should adopt it for their work, what benefits it brings, and why Brazilian research institutions and funders should require that work carried out by their researchers is made Open Access. The contrast is made between the 'traditional' system for publishing research findings and an Open Access research corpus for Brazil in terms of visibility and impact for Brazilian research.

Keywords Open Access, research publication, science in Brazil, science communication

Por que acesso livre no Brasil?

Resumo Este artigo define Acesso Livre e descreve seu funcionamento. Faz-se uma revisão dos motivos pelos quais os pesquisadores brasileiros devem adotá-lo no seu trabalho, os benefícios que traz, e por que as instituições de pesquisa e agências de fomento no Brasil deveriam requerer que o trabalho de seus pesquisadores seja posto em Acesso Livre. Destaca-se o contraste entre o sistema 'tradicional' de publicação de resultados de pesquisa e um corpo de trabalho em Acesso Livre em termos de visibilidade e impacto na pesquisa brasileira.

Palavras-chave Acesso Livre, publicação de pesquisa, ciência no Brasil, comunicação científica

The problems with scholarly communication

For centuries scholars and scientists around the world have communicated with one another in three main ways: first, by publishing their results and ideas in journals and books; second, by meeting together at conferences, presenting their work and discussing their fields of interest amongst themselves; and, third, by personal communication – letter, telephone and, latterly, email and other Web-based technologies.

It is the first of these methods that has featured most importantly in a researcher's career progression. Universities and research institutes, and public and private research funders, all expect to see a track record of publications from each researcher that reports their work, shows that they have carried out work of a standard sufficient to merit publication and disseminates the

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findings so that others can build upon them. Researchers find that this track record is weighed very heavily when it comes to obtaining a position, gaining tenure or winning promotion. And so it should be: the published output is a legitimate and sensible measure of a researcher's ability and contribution to his or her field.

The other side of the coin is that published work is made available to other researchers so that they can take it into account when carrying out their own research – to learn from, extend and build upon. A researcher's own work is shaped and guided by reading the published findings of others in the field. No researcher works in a vacuum: research is an incremental and often collaborative activity. A certain amount of iteration is also necessary, but having a published corpus in a field helps to mitigate excessive and wasteful duplication of effort.

But – and it's a big but – this system doesn't work properly and researchers are dissatisfied (Swan, 2008). It never has, but until the advent of the World Wide Web there was not much that could be done about it. Journals (and books) were published in print and shipped around the world to libraries that bought a subscription. Libraries that could not afford a subscription could only provide access for their patrons by buying copies of individual articles through inter-library lending services. In other words, access was restricted to those who had the money to pay.

The vast bulk of research carried out in universities and research institutes across the world is publicly-funded. Taxpayers pay for the work to be done and, in many cases, for the running of the institutions themselves. Given that the optimal situation is that all researchers have access to all research findings so that they can use them for their own work, what could be right about a system where the findings from publicly-funded research ended up in an access-controlled environment owned by a third-party supplier?

And yet that is what has happened. Moreover, the third-party supplier (the scholarly publishing industry) has, over the last two decades or so, raised the price of its products by four times the rate of inflation (**Figure 1**). A captive customer base, with no effective alternatives, had to pay out ever more so that researchers could see the results that other researchers had produced using public money.

Something had to give. Even before the World Wide Web arrived libraries were protesting at journal prices and becoming ever more selective in what subscriptions they purchased. Access to the research corpus was being reduced at a time when more researchers were producing more research findings.

Monograph and Serial Expenditures in ARL Libraries, 1986-2006*

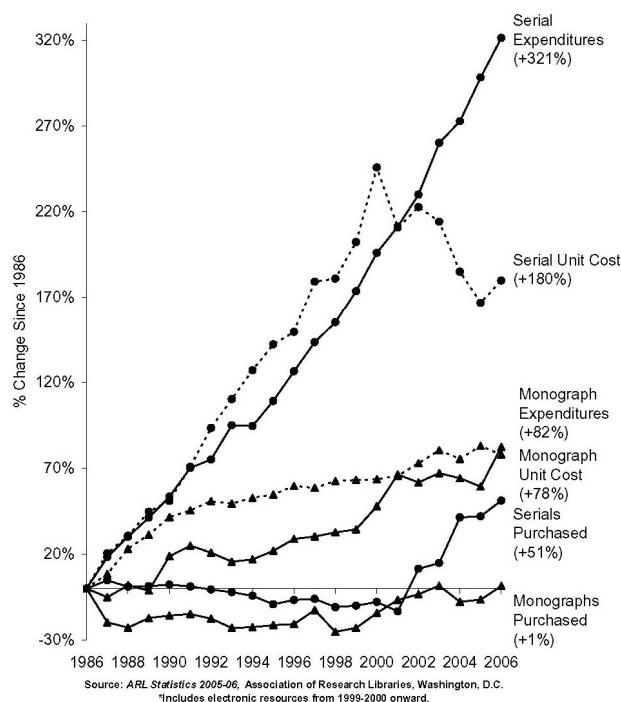


Figure 1: Money spent on journals and books by libraries in the USA (source: ARL1). During the time period shown the Consumer Price Index in the USA (a measure of inflation) has risen by just 78%, one quarter of journal price rises in that period

The advent of the Web, however, has brought a solution within reach. It is now possible to disseminate the findings of each of the world's researchers freely, without charge, to all other researchers – Open Access.

Brazil's scholarly communication problems

Brazil's researchers undertake a huge amount of scholarly and scientific research but that research does not get the readership and attention that it merits because of the faults that have grown up in the scholarly communication system, particularly in recent decades. Brazil's academic output has suffered from low visibility and poor dissemination outside Latin America. Most Brazilian journals do not sell in large numbers to libraries outside South America. Moreover, the major abstracting/indexing services do not cover enough of Brazil's (or regional South American) journals and so only Brazilian outputs that are published in the best 'western' journals enjoy the maximum visibility worldwide. For example, one of the longest-established Brazilian journals, *Revista Brasileira de Ginecologia e Obstetrícia*, is not indexed at all by Web of Science and another, *Cadernos de Saúde Pública*, although now in volume 23 with almost 150

¹ www.arl.org/bm~doc/monser06.pdf

issues published, has only been indexed by Web of Science since 2007. This is no way to gain visibility and impact across the world. What is more, to look at the other side of the coin again, Brazilian researchers do not always have good access to the journals they need to do their research optimally. These problems are shared across the developing world (Suber and Arunachalam, 2007; Kirsop and Chan, 2005).

While much investment is made in education and research in Brazil, the impact of this is minimised by the failure to grasp new opportunities offered by the Web for disseminating research results. The return on this national investment is therefore poorer than it should be.

The solution lies in the hands of the research community, which should be providing Open Access to all its outputs. Without this, Brazilian research is being condemned to relative obscurity when researchers could remove all barriers to visibility and maximise the impact that their work can have.

Open Access for Brazilian research

Still, more than a decade after the idea of the free dissemination of scholarship online was postulated, and five years since the Budapest open Access Initiative (BOAI)², there remains much misunderstanding about what Open Access is. Misunderstandings lead to misgivings and debates become bogged down in inaccuracies and some rather wild predictions of doom.

Open Access is making available copies of peer-reviewed research articles (and sometimes books, if the author and publisher wish) online, immediately (at or before actual publication) without any barriers and without any of the restrictions on use commonly imposed by publisher copyright agreements. It is important to remember that the focus is on peer-reviewed publications. Open Access is definitely not vanity publishing or self-publishing, nor is the focus on the types of research literature that scholars might normally expect to be paid for, such as books for which they hope to earn royalty payments. Open Access concerns the outputs that scholars normally give away free to be published – journal articles, conference papers and datasets of various kinds (Swan, 2005).

Research outputs can be made Open Access one in two ways. First, there are Open Access journals, publications that do not charge a subscription fee and which disseminate their content online for free. They have a variety of business models that enable them to be sustainable. At the time of writing there are nearly 3500 Open Access journals, between them providing free access to almost 200,000 articles. A list of them is maintained by the Library at Lund University in Sweden³. Included in these are the set of Brazilian research journals published under the SciELO (Scientific Journals Online) umbrella, which I will return to below. Some Open Access journals charge an article-processing fee which is normally paid by the author's institution or grant. Others do not charge a fee but have other ways of operating that enable them to run the journal without charging a subscription. The Web of Science lists some 200+ Open Access journals in its service and some of them have very high impact factors indeed. They operate peer review in exactly the same way as other traditional journals. The big Open Access publishers, the Public Library of Science⁴, BioMed Centr⁵ and Hindawi⁶ all offer waivers if authors cannot pay the

² Budapest Open Access Initiative: <http://www.soros.org/openaccess/>

³ Directory of Open Access Journals (DOAJ): www.doaj.org

⁴ www.plos.org

publication fee but wish to publish in their journals for the increased visibility that brings to their work.

The second way that articles can be made Open Access is for the author to place a copy in an online repository. This process has come to be known as 'self-archiving'. Suitable repositories are being established by universities and research institutes worldwide. They are interoperable and indexed by web search engines, thus forming a global database of freely available research. Already there are over 1000, with 56 of them in Brazil. Lists of Open Access repositories are maintained at Southampton University (Registry of Open Access Repositories: ROAR⁷) and by the SHERPA Project at Nottingham University (Directory of Open Access Repositories: OpenDOAR⁸). There is no charge at all for self-archiving and it is a simple process, taking just a few minutes for each article, yet it provides Open Access perfectly effectively and the visibility of an article is maximised through it.

Open Access provides the means to maximise the visibility, and thus the uptake and use, of Brazilian research outputs. Not only scholars benefit from Open Access and the instant worldwide visibility that it brings to their work Their institutions benefit from having a management information tool that enables them to assess and monitor their research programmes and a marketing tool that enables them to provide a showcase for those research programmes. Research funders – notably the Brazilian Government which spends the equivalent of around 7 billion US dollars on research each year – can monitor outputs from their funding, and measure and assess how effectively their money has been spent. They also can ensure that the results of their spending have had the widest possible dissemination.

The advantages of Open Access for science and scholarship are fourfold. Open Access brings greater visibility and impact for research, it enables science to progress more quickly, it enables better management and assessment of research and it provides the raw material on which the new semantic web tools for data-mining and text-mining can work, generating new knowledge from existing findings. These are four very important reasons for striving to achieve a complete Open Access corpus across the world as soon as possible (Swan, 2007).

What, then, is happening about Open Access in Brazil? The first thing to say is that Brazil has the commendable and farsighted SciELO programme⁹. This covers over 200 Brazilian journals and makes the entire contents freely available on the Web to anyone who is interested. And yes, Google Scholar does index SciELO's contents, making them readily searchable by anyone with an internet connection. The usage of SciELO's journals is high and growing rapidly as shown in **Figure 2**.

⁵ www.biomedcentral.com

⁶ www.hindawi.com

⁷ Registry of Open Access Repositories (ROAR) <http://roar.eprints.org/>

⁸ Directory of Open Access Repositories (OpenDOAR): <http://www.opendoar.org/>

⁹ <http://www.scielo.br/>

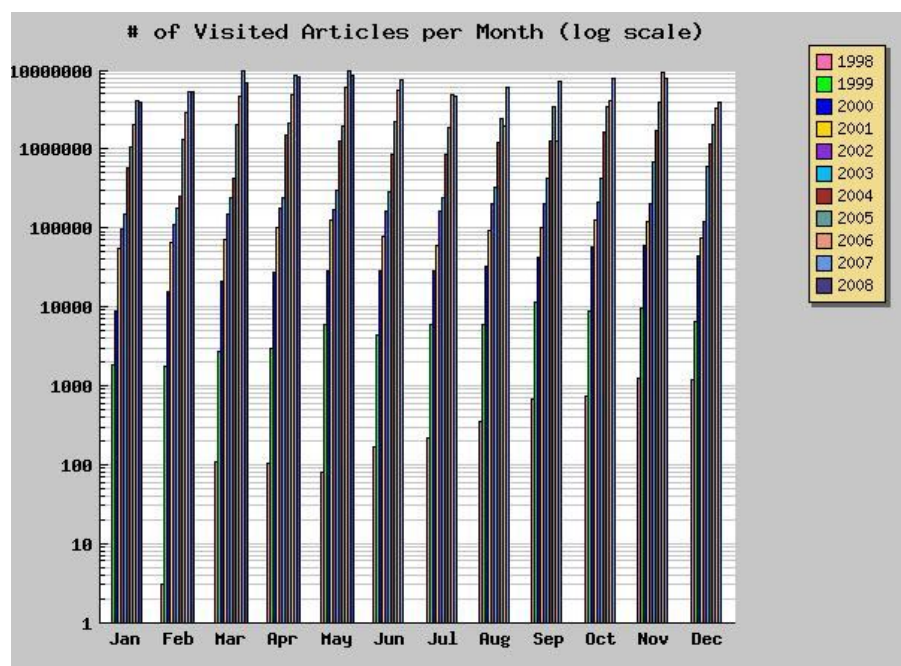


Figure 2: Usage of journals on SciELO's site in Brazil (data from www.scielo.br)

Second, there are a small number of Brazilian journals offered via the Bioline International service¹⁰, which hosts journals electronically and enables free access by anyone who wishes to use them. The extraordinary levels of usage of Open Access material offered in this way has been reported by Kirsop, Arunachalam and Chan (2007), who provide the statistics in **Figure 3**. These demonstrate the large numbers of accesses of Bioline International journal content from around the world and the growth in these accesses over recent years.

BIOLINE INTERNATIONAL SITE HITS BY YEAR WITH BREAKDOWN BY TYPE							
Year	Total hits (adjusted)	Table of contents hits	Article titles hits	Abstract requests	Full-text requests	Journal information requests	Search results
2002	224137		44548	105189	26961	7682	
2003	445679		116364	149211	45944	26315	
2004	854467		121546	288548	157809	33895	
2005	2723472	46859	86097	434935	1100615	34202	33637
2006	5749149	75537	162622	1097370	2496511	79334	66318

Figure 3: Usage of Bioline International content (from Kirsop, Arunachalam and Chan, 2007)

¹⁰ <http://www.bioline.org.br/>

Outside these initiatives, though, Brazil's research still sits largely behind subscription barriers in Closed Access journals, virtually invisible to the rest of the world. It is now up to Brazil's research community, from top to bottom, to grasp the opportunity presented to it by the Web and Open Access. Why has it not done this so far? What might be stopping progress in this sense?

Barriers to Open Access

Although Open Access is clearly in the interests of the research community only a minority of researchers are making their work freely available. Partly this is because of a lack of awareness of the issues and advantages of Open Access. Research funders and research-based institutions have a critical role in informing scholars and helping them to understand the issues and why it is important that their work be made available in this way and to help them overcome the barriers. What are these?

The first worry that authors have is about copyright restrictions imposed by their publishers. It is important to point out here that Open Access publishers (the publishers of Open Access journals) do not have any copyright restrictions at all: the copyright remains with the author of an article, who can make unlimited numbers of copies for distribution, use them in any number of copies for teaching and so on. This is quite different to the restrictive policies of many traditional publishers who require the author to relinquish copyright to the publisher and lay down strict rules about how the article may be used by the author and. But authors do worry about whether they have the right to self-archive their work in repositories if the publisher holds the copyright. In fact, over 60% of journals *do* allow self-archiving of the final, peer-reviewed version of an article (the 'postprint') and a further 28% allow the author to self-archive the 'preprint', the article before it has been peer reviewed (**Figure 4**).

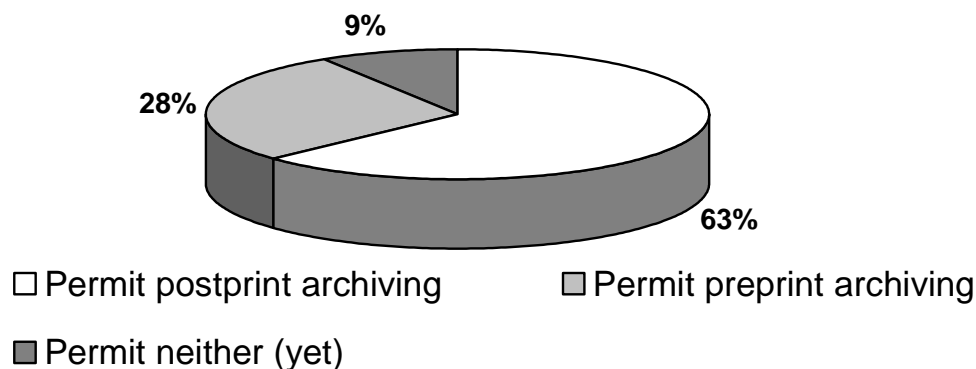


Figure 4: Journal permissions for self-archiving (from ¹¹)

Authors can check permission policies of journals through the publisher-permissions services offered by SHERPA¹² or by EPrints¹³.

¹¹ <http://romeo.eprints.org/publishers.html>

Second, researchers it might be difficult to deposit an article in their repository. In fact, the process is very simple and takes just a few minutes to do (Carr & Harnad, 2005). Details required include the article metadata (authors' names, affiliations, title of the article and so on), information about the type of article and whether it has been peer reviewed; finally, there is an uploading step where the article file is sent to the repository. The process is certainly no more difficult than submitting an article to a journal via an online submission system. Readers of this article can try depositing a paper by going to the EPrints demonstration site¹⁴. Researchers who were surveyed about this (Swan and Brown, 2005) told us that they found the process generally easy (see **Figure 5**).

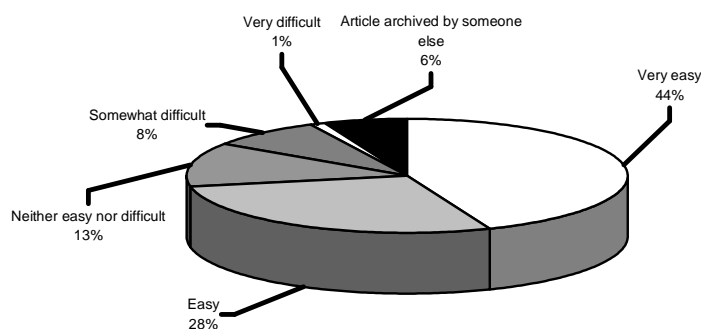


Figure 5: Ease of depositing an article in an Open Access repository

Promoting Open Access in Brazil

There is much that can be done to actively encourage authors to adopt Open Access. Making authors aware of the increased visibility, usage and impact their work will receive via Open Access is crucial. Earlier in this article the usage data for the journals hosted by the Open Access services SciELO and Bioline International were given. It follows that accessibility brings usage which in turn should bring additional impact for articles that are useful for researchers around the world who would otherwise have not known about it or not been able to access them.

Open Access repositories can also provide usage data to show the number of times articles have been downloaded. The levels of this type of usage can be surprising. For example, the University of Otago's Business School set up an Open Access repository in November 2005: by February 2006, with just 220 articles in it at the time, it had received almost 20,000 'hits' (downloads) (Stanger and McGregor, 2006). No doubt many of these will translate in time to citations. The authors at Otago are delighted and so they should be. Until they made their work Open Access in this way its visibility was constrained to those institutions whose libraries subscribed to the journals they were published in and having 20,000 article-reads in three months was almost certainly just a dream. There are a number of software packages that give data on repository

¹² www.sherpa.ac.uk/romeo.php

¹³ <http://romeo.eprints.org/publishers.html>

¹⁴ <http://demoprints3.eprints.org/>

usage. Google Analytics is one. IRStats (Interoperable Repository Statistics), newly-developed by the EPrints group at the University of Southampton, is another. An example of the 'usage dashboard' for an article deposited in the Southampton repository is shown in **Figure 6**. Graphs can be requested to show daily, weekly or monthly usage over time. The other indicators are referrers (which services are bringing people to the repository: Google is one example), which specific external sites are pointing users at the article, the top search terms used by searchers to find the article and the top academic sites downloading the article. All of these things are useful information for authors trying to boost their profile and the usage of their work.

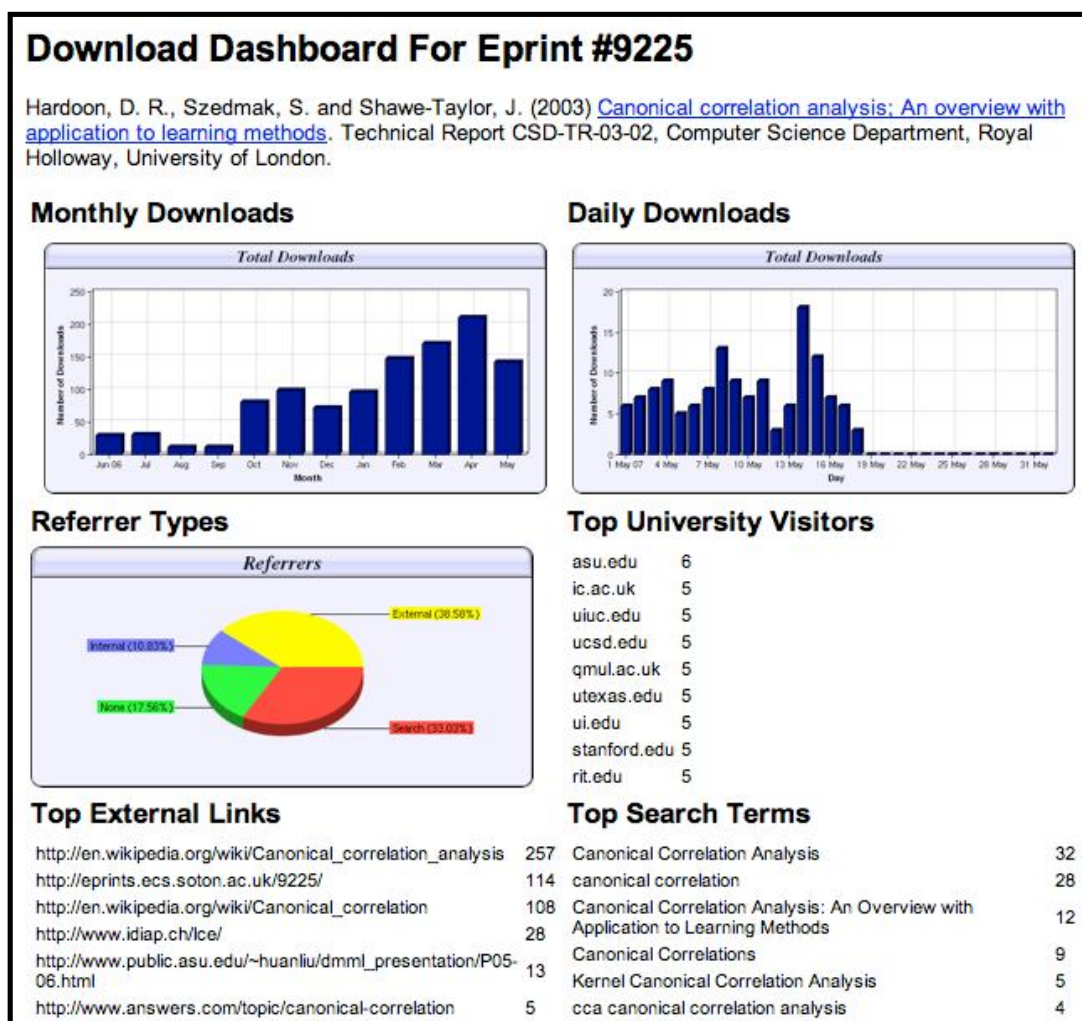


Figure 6: Download dashboard for an article deposited in the Southampton Open Access repository

A number of studies demonstrate this increased citation impact that Open Access can bring (Kurtz, 2004; Antelman, 2005). Stevan Harnad's groups in Southampton and Montreal are continuing this work. **Figure 7** shows their initial finding. The bars show the percentage increase in citations for articles that are Open Access articles compared with citations for Closed Access articles in the same issue of the same journal (Brody & Harnad, 2004, Brody, Harnad and Carr,

2005). There is an ‘Open Access impact advantage’ in all disciplines studied so far. This work is continuing and new disciplines will be added to the list in time.

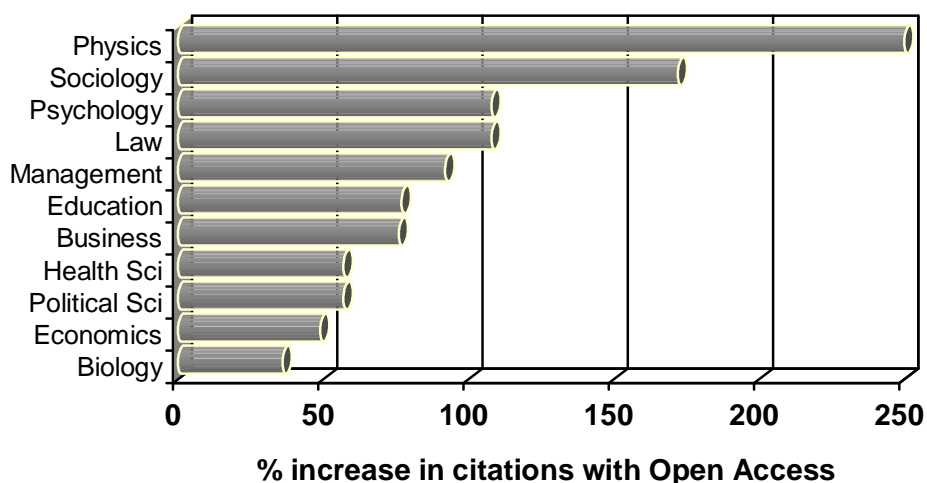


Figure 7: Increase in citations as a result of Open Access

These findings highlight another issue of importance to Brazil. Until now, the metric known as Journal Impact Factor (JIF) has been predominant. This is the metric developed by Thomson (ISI) in order to rate journals comparatively on the basis of citations to their articles. If a journal’s articles are highly-cited, the journal has a high Impact Factor. The Impact factor is an average, though, so the results can be skewed by one very highly-cited article amidst a mot of otherwise scarcely-cited ones, And of course the ‘citedness’ measure is for the journal as a whole and does not reveal any information about the citedness of the individual papers published in it. Nonetheless, as it was all that was available until recently, the JIF has had a huge effect on research, much of it detrimental. Employers and funders have used the JIF to assess candidates for new positions or for tenure. And since careers succeed or fail on the basis of journal impact factors, the primary publishing aim of authors – encouraged by their employers’ and funders’ obsession with this metric – has been to publish in journals with as high an impact factor as possible.

For Brazilian scientists, this is not a good state of affairs. If they want their work read widely in Latin America, and if they wish to support national or regional journals, Brazilian scientists incline towards publishing in Brazilian journals. But most of these are not indexed by Thomson for the Web of Science, and so do not have an Impact Factor. Now, in the Age Of The Web, it is possible to measure *individual* impact. The Web of Science gives citation data for each article now as well as an Impact factor for each journal. Even better, since it is free to use, Google Scholar also provides article citation counts. The future will be about assessing the impact of individual researchers rather than using the proxy (and unsatisfactory) JIF. And Open Access maximises an author’s chance of having a paper read and used and cited, boosting his or her own ‘impact factor’ as far as possible.

Finally, in respect of what can be done to encourage Open Access, there is the issue of Open Access policies. These are critical for two reasons. First, they help to make researchers more

aware of Open Access and what its aims are. Second, they secure author involvement – if they are formulated wisely. The number of policies from funders and employers are rising. The first big funder to formulate an Open Access policy to ensure that the work it funds is made Open Access was Wellcome Trust¹⁵ Many more funders have followed this example. In the UK the Medical Research Council and all the other big medical research funders, such as Cancer Research UK and the British Heart Foundation, fell into line behind the Wellcome Trust so that now over 90% of all funded biomedical research in the UK is covered by an Open Access policy. Six of the seven UK Research Councils have an Open Access policy. In the US, the NIH has one, as do many other federal research funders. Universities are also joining the throng because they, too, see the advantages in promoting their research and having it gain the best impact it can through Open Access. A list of institutions and funders with policies is maintained by EPrints¹⁶.

Policies must be properly formulated if they are to have effect. The evidence shows that *only mandatory policies work well*. Policies that just encourage or even request authors to make their work Open Access do not result in a sizeable level of compliance, partly because of the worries about copyright and so on discussed earlier in this article. Some people have questioned the use of mandatory policies in an academic setting, arguing that they sit uncomfortably alongside the tradition of ‘academic freedom’, but this is stretching the point too far. Academic freedom has always been about the right and duty of academic ‘neutral minds’ to investigate and report without the shackles of political or religious constraints. Open Access is not about shackling researchers in those ways; it is about the process of carrying out those academic activities optimally and about ensuring that in the interests of research progress public money is spent as well as possible. This means *not* just hiding results away in journals that work on the basis of *restricting* access rather than maximising it. Researchers already have mandatory policies guiding their behaviour with respect to carrying out their jobs – they are normally required to teach and profess their subject, to do research and to report it. If they are awarded grants by an external funder then they are required to write up reports of their funded work at the end of a project and to publish the findings. Open Access mandatory policies are merely another part of the same picture.

Do researchers balk at mandatory Open Access policies? The answer is no. We have asked authors on a number of occasions how they would behave if their employer or under required them to make their work Open Access. The results are shown in **Figure 8**. Over 80% said they would willingly comply and a further 14% said they would comply reluctantly.

¹⁵ Wellcome Trust (2005) Wellcome Trust position statement in support of open and unrestricted access to published research. http://www.wellcome.ac.uk/doc_WTD002766.html

¹⁶ www.eprints.org/openaccess/policysignup

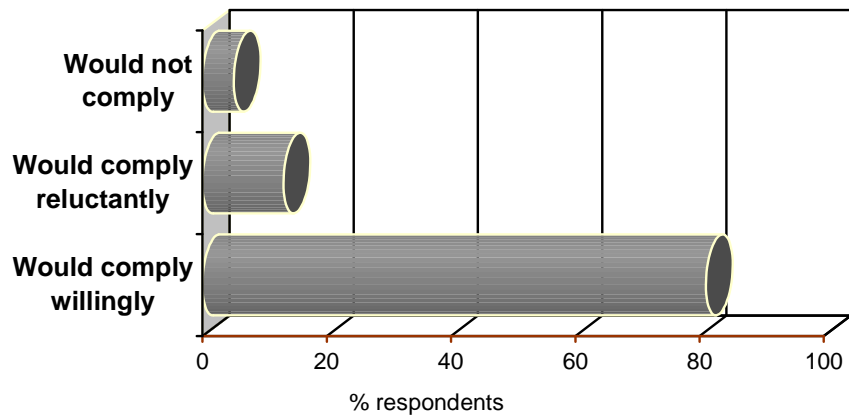


Figure 8: author willingness to comply with a self-archiving mandate from their employer or funder (from Swan and Brown, 2005)

This point is important. Institutions or funders that have introduced a mandatory policy for Open Access see their repositories filling with articles while those that have no Open Access mandate have repositories whose content represents only a fraction of their total output. **Figure 9** shows the results from a study by Arthur Sale on the contents of a number of Australian university repositories and clearly demonstrates the effect of the recent mandatory policy on Open Access introduced at Queensland University of Technology (QUT). The graph shows the percentage of government (Department of Education, Science and Training) funded research articles collected into university repositories in the years 2004 and 2005. The mandatory policy resulted in a vastly greater percentage of articles being collected at QUT than at the other universities, none of which have mandatory Open Access policies (Sale, 2005).

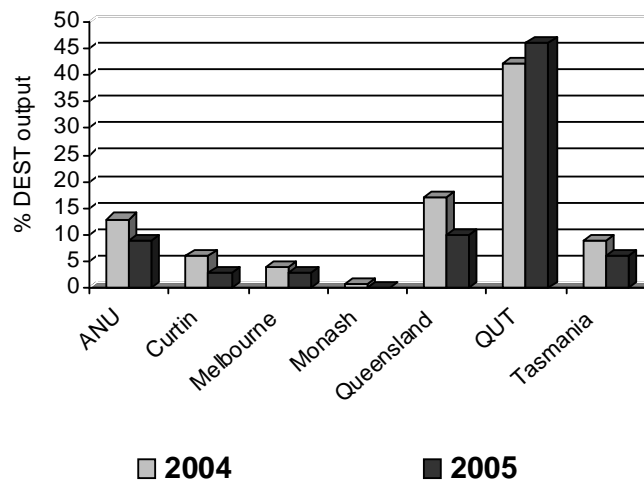


Figure 9: The effect of an institutional self-archiving mandate at Queensland University of Technology (from Sale, 2005)

The adoption of Open Access is considerably dependent, then, upon the actions of research administrators and funders. Around the world they are beginning to act. It is in Brazil's interests that her research output is available for all the world to see. Brazil needs well-formulated Open Access policies now, from its research institutions and research funders. In November 2006 a conference took place at the Indian Institute of Science in Bangalore on the future of science publishing in developing countries. It brought together Open Access experts and advocates, publishers, funders, administrators and scientists from India, China and Brazil to discuss the best ways forward. The outcome was the drawing up of an optimally-worded Open Access policy for institutions and funders to use¹⁷. The implementation of this Commitment is exactly what Brazil needs now. Time is being lost.

Brazil also needs its researchers to play their part in making their work Open Access. They will see hugely beneficial results. The increased visibility of Open Access articles and the positive outcomes this can have for authors is summarised perfectly in this comment provided by one author during one of our periodic surveys:

“Self-archiving has given instant world-wide visibility to my work. As a result, I was invited to submit papers to refereed international conferences/journals and got them accepted.”

We constantly hear of how Open Access has enabled new connections and new collaborations between researchers around the world whose work has suddenly become highly visible. Scholars working on the same or related topics, and who were previously unaware of each other's existence, start conversations and collaborate. This is how scholarship *should* be, and it is the World Wide Web that has made it possible. Unimpeded worldwide communication and discovery are now possible and the research community can make them the norm by embracing Open Access.

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¹⁷ <http://www.ncsi.iisc.ernet.in/OAworkshop2006/pdfs/NationalOAPolicyDCs.pdf>

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