

Open Educational Resources Initiatives in Oceania

The evolution of open access to research and data in Australian higher education

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Abstract

Open access (OA) in the Australian tertiary education sector is evolving rapidly and, in this article, we review developments in two related areas: OA to scholarly research publications and open data. OA can support open educational resource (OER) efforts by providing access to research for learning and teaching, and a range of actors including universities, their peak bodies, public research funding agencies and other organisations and networks that focus explicitly on OA are increasingly active in these areas in diverse ways. OA invites change to the status quo across the higher education sector and current momentum and vibrancy in this area suggests that rapid and significant changes in the OA landscape will continue into the foreseeable future. General practices, policies, infrastructure and cultural changes driven by the evolution of OA in Australian higher education are identified and discussed. The article concludes by raising several key questions for the future of OA research and open data policies and practices in Australia in the context of growing interest in OA internationally.

Keywords

open access, OA, open data, open access publishing, repositories, theses

La evolución del acceso abierto a la investigación y a los datos en la educación superior en Australia

Resumen

El acceso abierto (AA) en el sector de la educación superior en Australia ha experimentado una rápida evolución. Este artículo revisa los avances en dos áreas relacionadas: el AA a las publicaciones de investigación científica, y a los datos abiertos. Por un lado, el AA puede suponer un apoyo a los recursos educativos abiertos (REA) en la medida en que proporciona acceso a la investigación para el aprendizaje y la enseñanza. Por otro lado, un amplio abanico de actores (que incluye universidades, sus principales órganos, organismos públicos de financiación de la investigación, así como otras organizaciones y redes que se concentran explícitamente en el AA) se muestran cada vez más activas en estos ámbitos de distintas maneras. El AA invita a cambiar el statu quo en todo el sector de la educación superior, y el impulso y el dinamismo actuales en esta área sugieren que se seguirán produciendo cambios rápidos y relevantes en el contexto del AA en un futuro previsible. El presente artículo identifica y analiza también las prácticas generales, las políticas y los cambios culturales e infraestructurales derivados de la evolución del AA en la educación superior en Australia, y concluye planteando diversas cuestiones clave relativas al futuro de las prácticas y políticas en materia de datos abiertos y de investigación de AA en Australia en un marco de creciente interés por el AA a escala internacional.

Palabras clave

acceso abierto, AA, datos abiertos, publicación de acceso abierto, repositorios, tesis

OA is a kind of access, not a kind of business model, license, or content.

(Peter Suber, 2013)

1. Introduction

The influence of the international open access (OA) movement (Suber, 2013) is evident across the teaching and research missions of Australian universities (Picasso, 2013). Open educational resources (OER) (OERu, 2013) are explored elsewhere in this Special Section. In this article, we focus on OA to scholarship and to a lesser extent open data, for which OA initiatives are less mature. We focus on these two related areas in order to broaden this Special Section's discussion of open practices in higher education in Oceania. In doing so, we outline the dynamic evolution of OA in both spheres in Australian higher education in the period 1998 to the present. OA in Australian higher education has evolved significantly over the past 15 years and continues to do so. However, the process is uneven across universities, the public agencies that fund research, the Commonwealth government, and other organisations that make up the Australian higher education sector. Some institutions have developed policy positions that are strongly facilitative of OA, for example, the Queensland University of Technology (QUT, 2013). For others, such as our institution, the University of Newcastle (UoN, 2012), current policy frameworks are supportive, but weaker. For yet others, evidence of engagement with OA is negligible. In this article, we identify the key areas in which OA and open data are evolving most rapidly.

In parallel with the evolution of OER initiatives (Phelan, 2012), the introduction and spread of OA approaches to research publications and data in Australian higher education is contested and ongoing. Contestation over the shift to OA manifests in numerous ways and reflects in part the cultural and institutional change that OA invites: OA presents challenges to the higher education sector in terms of the ways scholarship is undertaken and data are managed and re-used. But OA presents significant opportunities too, both public benefits and private benefits.

This article proceeds as follows. In the next section, we briefly review the influence of the OA movement internationally as the context for developments in Australia. In section three, we explore the varied elements of Australian higher education in which OA is contested and evolving, and we introduce more recent and less mature initiatives in open data. Section four discusses the processes of contestation between OA approaches to research publications and data and the status quo. Section five concludes the article.

2. Open Access: Contested evolution

OA presents significant benefits for both public and private aspects of higher education (Bloom, Hartley, & Rosovsky, 2006). Public benefits are enjoyed by society overall, consistent with the notion of the sum of human knowledge being part of the commons (Fuser Morrell, 2010). Private benefits are enjoyed by the individual researchers and their institutions engaged in scholarship and data management, publication and re-use (Bloom, Hartley, & Rosovsky, 2006). The growth of OA and access to research data in higher education is made tangible by the advent of, and changes to, OA policies of universities and other key actors engaged in knowledge production. As such, changes in institutional OA policies can be used to track the growth and spread of the OA movement internationally. For this review, we bring focus to the OA movement (Joseph, 2013), as an instigating force for institutional policy change on scholarship and research data governance.

Standard inquiry approaches used to make sense of changes in education policy, especially where policies developed in one national context are used in another. For example, Rizvi and Lingard (2010) refer to the globalisation of education policy. Steiner-Khamsi and Waldow (2012) refer to both *borrowing* and *lending* to highlight that there can be agency at both ends of the policy transfer link: changes in policy can both be exported from their site of origin and imported to their destination.

Such well-developed approaches are helpful in understanding the spread of education policies across borders, and certainly OA and open data management policies are spreading globally. However, the case of OA contrasts with typical policy exchange processes in that OA is a coherent movement, and a counter-hegemonic (Gramsci, 1991) one at that, with origins in the 'grassroots' rather than amongst the ranks of already comparatively powerful actors, such as established academic publishing houses. The OA movement "constitute[s] a radical non-propertarian alternative to traditional methods of text production and distribution. This alternative non-proprietary method of cultural exchange threatens traditional [business] models" (Peters & Roberts, 2012, p. 2). In short, we see in the advent and evolution of OA policies evidence of contestation between an alternative vision of how the world could be and the (increasingly questioned) status quo. The pace and extent of policy change in the OA area reflects the ongoing struggle between actors with interests vested in the current state of play and actors seeking to bring the OA vision into being.

2a. International context

The international OA movement promotes the immediate, free-of-charge, unrestricted online access to research and scholarly outputs. The Budapest Open Access Initiative and the 2002 BOAI declaration (BOAI, 2002) support two key strategies for achieving OA: self-archiving and OA journals. Self-archiving supports authors to deposit copies of their peer-reviewed articles into an electronic archive that conforms to standards developed by the Open Archives Initiative (OAI, n.d.). The advent of OA journals provides a new model for the dissemination of research outputs where their content is made available free of charge to readers. OA journals use as their basis a copyright model whereby copyright generally remains with the author and material is published under an open license (e.g. Creative Commons). That is, the author assigning copyright exclusively to the journal is not a condition of publication. This is in marked contrast to the practice of most subscription-based scholarly journals historically and currently.

Self-archiving of scholarly research outputs, consistent with the OA strategies identified above, requires corresponding infrastructure to support the deposit of archival publications. This infrastructure takes the form of institutional and subject or discipline-based repositories. In the years following the 2002 BOAI declaration, there has been exponential development and growth of OA repositories globally. The current extent of repositories as a strategy used by universities to provide access to research is evidenced by the Registry of Open Access Repository (ROAR, n.d.) and OpenDOAR, the Directory of Open Access Repositories (OpenDOAR, 2006-2011). Universities and research organisations worldwide, led predominantly by library initiatives, have taken up the cause of OA and actively participated in the development and implementation of institutional OA repositories. OA repositories manage, store, and disseminate digital e-print archives.

Similarly, the number of OA journals has grown exponentially in recent years, with 26 of Australia's 39 universities currently publishing OA journals (AOSG, 2013). Peer-reviewed OA journals follow the same rigorous review

processes and models as used for traditional scholarly publication.¹ The Directory of Open Access Journals (DOAJ, 2013) demonstrates the growth of OA journals in the scientific and scholarly publishing arena.

3. Open access scholarship and data in Australia: Key actors and initiatives

Nationally, the OA movement is represented by advocacy groups such as the Australian Open Access Support Group (AOASG, n.d.) and the Council of Australian University Librarians (CAUL, 2009a), who have supported and provided representation and advice on OA developments within universities and university libraries. CAUL's initiatives supporting OA are driven by its Research Advisory Committee (CRAC) (CAUL, 2009b) and its predecessor the Open Scholarship Initiative Advisory Committee (COSIAC). Similarly, the Australian National Data Services (ANDS) project has raised awareness and fostered discussion advocating data management, discovery and re-use in the higher education and research sector (ANDS, n.d.).

The OA movement has found allies in bodies funding research. Key actors driving the funding of OA scholarship and open data in the Australian higher education sector include the federal government and its two primary research funding agencies, the Australian Research Council (ARC) and the National Health and Medical Research Council (NHMRC) in particular. Recent changes to ARC and NHMRC funding agency policy in support of OA dissemination of research outputs and a range of government investments in research infrastructure over a number of years have facilitated the growth of OA across the higher education sector, as discussed below. The remainder of this section reviews significant initiatives in the expansion of OA and open data in Australia.

3a. Theses

Thesis repository initiatives were formative influences on OA in Australia. The Australasian Digital Theses (ADT) Program (CAUL, 2013), which ran from 1998 through 2010, was instrumental in influencing the transformation in Australia to provide free OA to research higher degree theses from Australian universities. The ADT initiative was funded by the ARC and consisted of seven Australian university libraries implementing a distributed network model. The Program provided a web portal service enabling universities to contribute descriptive metadata records about their theses in addition to providing a link to free, online, full-text copies of locally-hosted theses. This contrasted with the then traditional practice of researchers accessing print copies of theses from other institutions via an inter library request, usually for a standard fee. Universities and students voluntarily participated in the ADT Program.

The initial model was expanded as additional Australian (and New Zealand) universities joined the Program. Over time, the practice of making the full text of theses available online via OA has been widely adopted across Australian higher education institutions. In many cases, this transition has also included a progression from voluntary submission to an institutional compliance requirement, with accompanying rules governing submission of research higher degree theses. The ADT Program was superseded in 2010 by the National Library of Australia's (NLA) Trove service (NLA, n.d.): Trove 'harvests' theses from institutional repositories into the NLA's repository. .

1. A recent 'sting' by a *Science* correspondent claims to have exposed poor practices by OA journals that charge authors a publication fee (Bohannon, 2013), but has been criticised: Eve (2013) argues the study exposes instead limitations of the peer review process generally and points to an earlier study (Peters & Cedi, 1982), which predates the advent of OA as a coherent global movement, that highlighted similar concerns about the reliability of the peer review process.

3b. Repositories

In addition to the ADT Program, a number of major projects were funded in 2003 by the Australian Commonwealth Department of Education, Science and Training, and were instrumental in providing further capability to progress the OA movement in Australia. These included: the Australian Research Repositories Online to the World (ARROW) Project; the Australian Partnership for Sustainable Repositories (APSR) and Regional Universities Building Research Infrastructure Collaboratively (RUBRIC) Project. Together, these individual projects each supported consortia of universities to work collaboratively to investigate and implement repository infrastructure and capability to provide new services for scholarly publishing and open source software.

At that time, only a few 'early adopter' Australian universities had already established OA repositories using EPrints, which is a repository software, at their institutions. The investment by the Australian government provided a platform for wider engagement across the sector and many universities actively involved in these initiatives established their own OA repositories.

Over a three-year period, 2007-2009, the government provided further funding to assist universities to establish and maintain institutional repositories to support the assessment of research. Built on previous project investment, the Australian Scheme for Higher Education Repositories (ASHER) was an additional commitment towards providing capability to make publicly-funded research more available.

However, there is a tension between the support that institutional repositories provide for the Excellence in Research for Australia (ERA) initiative on the one hand (non-public dark archives) and providing OA to research publications on the other. This, in turn, reflects a tension between the ERA initiative, which does not currently facilitate OA directly, and federal funding initiatives that have supported the implementation of institutional repositories.

The purpose of the ERA initiative is to identify and promote excellence of research activity in higher education institutions (ARC, 2013). The ERA-specific role that institutional repositories play is providing access to the full text of each university's nominated research publications to the ERA-mandated external research panels tasked with assessing universities' research performance. In practice, this means published versions of manuscripts, i.e., as they have appeared in journals. As such, the ERA system rewards publication by traditional for-profit publishers. This in turn can lead individual researchers' to perceive that the value of published work lies predominantly with that publishing model. This contrasts with new and emerging government research funding requirements supporting OA publication and dissemination.

Even while addressing institutional ERA requirements, institutional OA repositories could provide OA to much of that same research. OA repositories can archive 'final accepted' versions of authors' work. Final accepted versions are authors' manuscripts as accepted, i.e., with all peer review amendments made, but without final typesetting. For the purposes of assessment, the value of OA publications would need to be strongly articulated within the ERA assessment framework. This is currently not the case.

For their part, universities have stronger or weaker policies to support this. Adopting good practice when developing an OA (Shieber & Suber, 2012) policy can help to strengthen institutional investment in OA. Internationally, the University of Liege in Belgium is a leading example of a strong policy. Nationally, the Queensland University of Technology is a leading Australian example of strong policy. In practice, however, individual researchers' use of this service can be mixed, whether compliance is mandated or not by the institution.

3c. Publishing

Another recent OA initiative in the Australian higher education sector has been in publishing OA journals and books. There are in excess of one hundred and twenty OA journals listed in the Directory of Open Access Journals and an increasing number of OA journals are hosted and supported by universities (AOSG, 2013) using publication systems such as the Open Journal System (OJS), a free open source software developed by the Public Knowledge Project (PKP) to enable support for the development of peer-reviewed OA publishing. This has enabled institutions to provide an easy, cost effective solution to support dissemination of scholarly research at the institutional level. OA journals represent a radical challenge to for-profit academic publisher's business models. For-profit publishers have responded with weak versions of OA to their own products, dependent on authors themselves, or their institutions, paying a fee to compensate for income foregone through readers' free access to individual articles.

The rise of the OA movement has also led to a resurgence of the venerable tradition of the university press, albeit bearing some customisation for the digital age. The Australian National University's ePress was established in 2003 and enabled new methods for scholarly publication. With over three million downloads of their titles reported in 2010 (Hollier, 2012), the successful distribution and readership reach of the model is evident. In addition to the Australian National University, university presses are in operation at Monash University, University of Adelaide, University of Technology Sydney and Sydney University. The University of Newcastle is a member of University Press Australia, a newly formed consortium with Swinburne University and Curtin University.

E-presses also provide the opportunity for new business models such as freemium and crowdsourcing (AOSG, 2013). However, this resurgence in university e-presses has not been universally welcomed. One media commentator (Adler, 2013) suggests that in-house e-publishing initiatives established by university libraries threaten intellectual property rights and are a 'second best' option suitable only for academics who fail to pique commercial publishers' interest for their specialised research with narrow audiences. In contrast, supporters of OA (e.g., Missingham, 2013) argue this analysis is flawed, citing studies (e.g., Houghton & Sheenan, 2009) that show return on investment in scholarly work published via OA is up to ten times greater than traditionally copyright-restricted works.

3d. Open data in Australia: A new frontier

In contrast to OA, open data initiatives are less mature. Data collection, management, publication and re-use vary from the scholarly publishing aspect of research culture in important ways. Whereas OA publishing initiatives present a radical challenge to the for-profit publishing business model, this is not the case in the area of data management and publication. But other challenges are present, the key one being research culture, and the way researchers think about the data they collect. Typically, researchers consider data they collect as belonging to them and them alone. Routinely sharing collected research data will require significant cultural change on the part of individual researchers.

The major government-funded initiative to provide the infrastructure necessary to support an open data environment is the Australian National Data Services (ANDS). The ANDS Establishment project commenced in 2008 and, since that time, has funded multiple programs to build capability and capacity to support the management, sharing, re-use and discovery of research data. Two key programs initiated under ANDS are Seeding the Commons and Metadata Stores, which assisted in identifying and describing (i.e., providing metadata for) research data in institutions for the purpose of making these discoverable in a national web portal, Research Data Australia (RDA). Both programs also supported the building and implementation of required infrastructure.

Implementing compliance frameworks is the other strategy being used to support the shift to manage and provide access to research data. The *Australian Code for the Responsible Conduct of Research* was developed jointly by the NHMRC, the ARC and Universities Australia, the peak body for Australia's universities. The code provides a national framework for research practice in Australia and guides institutions in the development of their own practices, guidelines, requirements and policies. It also provides guidelines as bases for institutional policies relating to the ownership, management and retention of research data, and access to the data by others in the wider research community. The outcomes and deliverables of the Seeding the Commons and the Metadata Stores programs have assisted universities and research organisations with implementing infrastructure and developing local expertise to better manage their research data assets. A focus on the development of institutional policies supporting the requirements of data management as outlined in the code may help align local governance with national compliance frameworks.

4. Discussion

OA provides broader access to academic research outputs for scholars, students, professionals and the general public. OA in its strongest form provides for immediate, free-of-charge access to research publications. Users of scholarly research are able to read, download, copy, distribute, print, search for and link to the full text of OA articles without payment or access barriers (Picasso, 2013). The benefits of OA extend to creators of scholarly knowledge too. For example, OA can increase readership and impact, including more citations of researchers' work (Gargouri et al., 2010; Swan, 2010). OA may also accelerate the pace of discovery and the translation of research from discovery through to application phases (Suber, 2013). For institutions, OA provides benefits in two areas. First, OA provides an opportunity for institutions to showcase their researchers and their research outputs. Second, and thinking very practically, OA scales with the expansion of the literature, even as library budgets do not (Picasso, 2013).

However, while there are apparent advantages to OA, OA entails new ways of doing scholarship and managing research data. In the context of scholarly publishing, OA represents a radical challenge to the status quo of the for-profit business model. This challenge is more than timely, with the "ruthless" and "monopolistic" (Monbiot, 2011) conduct of academic publishing houses increasingly coming under fire (see also *The Cost of Knowledge*, 2013).

The increasing acceptance of OA may also drive changes in academic reward structures. Traditionally, rewards have been geared around publishing in highly regarded publications, with journal esteem serving as a proxy measure for the scholarly merit of published work. However, while generally not as highly regarded as older, established for-profit journals, OA journals, by virtue of their greater accessibility, offer authors higher citation rates amongst other researchers as well as the possibility of scoring more highly on alternative impact metrics based on social media (e.g., Twitter) references to scholarly articles (Mounce, 2013). In somewhat pithy language, this evolving shift in esteem measures has been described as a shift from "publish or perish" to "visible or vanish" (Lamp, 2013).

Both OA and OER initiatives contribute to global efforts aimed at broadening access to teaching, learning, research and data in both developed and developing countries. OA further supports OER by making scholarly research accessible for learning purposes and for incorporation in OER. Whilst both also facilitate the sharing of knowledge, they each present challenges to higher education sectors. OER presents a challenge in the form of business models, which have yet to demonstrate a proven sustainable revenue source (Olcott, 2012). OA initiatives fare better in this regard: research funding agency mandates and compliance with OA dissemination policies are

currently a significant key driver in the OA sphere, and these developments contribute towards the business and service models for OA institutional repositories. However, OA uptake is limited by the required cultural changes within the research community that OA and open data imply.

In the context of research practice, open data implies a profound change in the way researchers think about their research data, as well as in their data collection, management, discovery, citation and re-use practices. Significant challenges in operationalising open data remain. Firstly, the arguments for open data have not been fully established and researchers remain far from comprehensively invested. While some researchers are strongly supportive (e.g., Heathcote & Dijkgraaf, 2013), others are less so. Additionally, open data raises questions about what is and is not common about research data across disciplines and research methodologies. The classic dichotomy between quantitative and qualitative data is one example: it may be that quantitative data lend themselves more easily to sharing for multiple diverse uses in ways that many qualitative data do not. Other questions relate to maintaining the privacy of research subjects' information where humans are involved. In the context of potential competition rather than collaboration between researchers, further questions relate to what period, if any, might constitute a reasonable period of sole access for the researchers who actually collected the data. And for data to be accessible in practice, informative metadata, i.e., descriptive information about data, must be provided well, similarly to the way individual resources in a library (books, journals, etc.) are described in library catalogues.

If researcher culture is to change, incentive and reward structures will need to reflect the value of sharing data. In that vein, Nature Publishing Group's new journal *Scientific Data* may herald a viable melding of open data with traditional academic reward structures, by ascribing a value to data similar to that bestowed upon research articles. *Scientific Data* is "a new open-access, online-only publication for descriptions of scientifically valuable datasets. It introduces a new type of content called the Data Descriptor designed to make your data more discoverable, interpretable and reusable" (NPG, 2013).

5. Conclusion

The OA movement in the Australian higher education sector comprises a range of diverse actors, has found allies in research funding bodies and has effected significant change in Australian higher education. This is particularly so in relation to OA since 1998 where, with government support in the form of funding for infrastructure and compliance frameworks for repositories and research outputs, university libraries have led efforts to create OA repositories, initially for theses. More recently, repositories have been expanded to house OA copies of final accepted versions of manuscripts published in for-profit journals. Some universities have also engaged in publishing OA journals and e-books. OA represents a significant challenge to the for-profit academic publishing model. For-profit publishers have responded by creating a weak (author pays) form of OA in order to protect their business model.

How the future of scholarly publishing continues to evolve remains to be seen, but aside from the attractive principles of OA, i.e., that intellectual endeavours should be considered part of the commons, the increased citation rates that OA journals offer suggest they are being read and, coupled with the inherent potential for initiation of broader academic discussions and earlier transmission to praxis, this is likely to encourage their increasing acceptance amongst researchers. In comparison to scholarship, open data represents a new frontier of sorts. Australian initiatives in this area are much less developed; questions about what open data means, and if, where and how an OA approach can be applied to data are still evolving. While there are no vested financial interests

ranged against open data, a transition to OA implies a significant cultural change amongst researchers. For this to eventuate, researchers will need to form the view that open data, like OA, entail public and private benefits. As for OA generally, this remains contested and a work in progress.

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