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151. Diffusion of Open Access: Why are some disciplines more successful than others?

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Abstract

Since the first international statement on open access – the Budapest Open Access Initiative in February 2002, a growing number of open access publishing outlets have become available, and several policies in the European Union and the U.S. have been introduced to mandate the open access archiving of publicly funded research. In spite of these strides, research practices today are still far from completely embracing the open access movement. In this research in progress, we draw on models of the diffusion of changes in institutional practices across networks in order to understand how open source practices of unrestricted access to information and ideas have spread in the academic and research disciplines – in short, the diffusion of open access models of research dissemination across disciplines.

Keywords: open access, diffusion, open source practices, institutional change

Introduction

Open access to research is an adherence to the principle that the fruits of research and science should be openly available to all those who would benefit from them (Willinsky 2006). While the beginning of the open access movement can be traced back to the early 1990s when in 1991 physicist Paul Ginsparg founded the first self-archiving repository for academic research – arXiv, it was not until recently in 2003 that the movement gained prominence in the public eye, when *Nature*, *Science* and *The Scientist* ranked it as one of the top stories of the year (Albert 2006; Willinsky 2006). In addition to being an issue interesting to academic researchers, the open access movement is now a matter of concern for government policy makers and agencies involved in research, public libraries, as well as publishers.

Open access can be viewed as attempting to provide analogous freedoms to scholarly research that open source software provides to its users (Willinsky 2005). In short open access allows users to “read, download, copy, distribute, print, search, or link to the full text of works” (Albert 2006, p. 254; Budapest Open Access Initiative 2002). The impetus for the open access movement has come from increased dissatisfaction with the traditional publishing models of academic research in which the rising costs of journal publication outlets have resulted in libraries and academics being unable to access the knowledge in these journals, in spite of the public funding that enabled this research.

There are two suggested ways of opening access to research: the first is to establish open access journals that do not charge readers (“gold” road), and the second is to establish publicly accessible repositories where authors can self-archive their work (“green” road) (Harnad et al. 2004). Within the first, there exist different economic models ranging from

author fee-supported open access journals to those that are subsidized by academic associations. There are also variations in between of delayed (time-lagged) open access and selective open access (to developing countries) of traditional publisher journals (Willinsky 2006).

In spite of the apparent benefits of open access to research, most researchers continue to publish their work in journals that require subscriptions that make them prohibitive for the general public to access. One reason for this can be attributed to the general lack of awareness of open access among most academic researchers (Allen 2005; Swan 2006). While prior studies have found that researchers reported that they *would* self-archive after they had been made aware of the benefits of open access, the reality is that still relatively few researchers will voluntarily self-archive their work in publicly accessible repositories. While overall acceptance of open access practices is still relatively low, there are disciplinary differences in the extent to which authors embrace open access alternatives to publishing as evidenced in the percentage of published works that are released through open access outlets as well as the differences in the citation impact factor of the research published in open access journals (Hajjem et al. 2005). An examination of the Directory Open Access Journals (<http://www.doaj.org>) indicates that there are a greater number of journals listed for the sciences than there are for the social sciences. Overall the results indicate that the open access movement has had relatively more success in the science, engineering/technology and medicine fields than in the law, humanities and social sciences. Even within the sciences, there are differences in the effectiveness of different initiatives to promote open access. While BioMed Central and the Public Library of Science (PLOS) both publish open access journals for biology and medicine, the PLOS open access journals for biology (PLOS Biology) have a higher impact factor (14.7) than BioMed Central open access journals for the same subject area (9.71).

Although the published research to date shows some evidence of the different rate of diffusion of open access practices across disciplines, there has been little systematic research examining the diffusion of open access practices across disciplines. The existing research to date of the open access movement has focused on the impact and preconditions for the success of the overall movement, assuming that the adoption of open access research publications will exhibit similar characteristics and processes regardless of academic discipline. In this paper, we will employ a comparative case study approach in order to answer the following research questions:

1. *How do academic disciplines and communities differ with respect to the diffusion of open access practices?*
2. *Why are some academic disciplines and communities more likely and successful in promoting the adoption of open access practices among its members?*

We define open access practices in this study as the set of behaviors and research activities by academics that lead to research outputs being placed in the public domain, where anybody can access it – these can include activities such as self-archiving of publications, posting of articles to institutional repositories, submission of articles to open access journals, active citation and consumption of research published in open access outlets and active advocacy of open access movements.

The purpose of this research is to understand the cross-disciplinary differences in rates of change from traditional publishing of academic research towards open access publishing. In order to understand how the institutionalized practices related to publishing the results of the

research process of different academic disciplines change over time from closed-access publishing towards an increased adoption of open source research practices, we conduct an analysis of the major actors and events associated with the open access movement within the life, engineering and social sciences. We focus in particular on the role of key individual and organizational actors in the diffusion of open access research practices. After a description of the open access movement, we provide a brief overview of related theoretical perspectives on institutional change and the diffusion of new practices across organizational fields. We then describe our research approach and conclude with a description of anticipated outcomes from this study.

Background on the Open Access Movement

The open access movement has gained in awareness among certain stakeholders in the research process due to what is referred to as the “serials crisis” – the breakdown of the traditional publishing model in which access to the research output of academics is controlled by for-profit publishers who constrain the researchers’ freedom to distribute and access both their own and others’ research (Willinsky 2006). As shown in Figure 1, the journal price increase in the past 20 years, from 1984 to 2003 has far outstripped the moderate growth of the libraries’ budgets, thus making the research they contain increasingly inaccessible. This situation is confirmed by reports from the American Research Libraries (ARL) whose members have been forced to cut back 6% of their journal subscriptions since the late 1980s. Library book budgets were also cut in order to maintain subscription to journals that various disciplines considered to be critical outlets for research in their field.

Figure 1: Journal price increases significantly ahead of library expenditure and inflation
Index: 1984=100

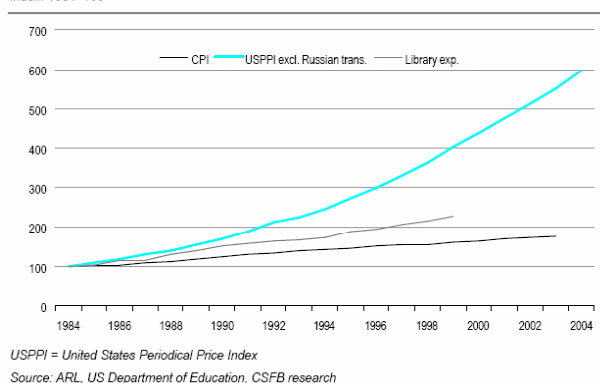


Figure 6. Increase in Journal Price (1984-2004)

The first self-archiving preprint repository – arXiv – was created by a physicist in August 1991. In 1994, cognitive scientist Steven Harnad posted a “subversive proposal” asking all researchers to post their work in publicly accessible Internet archives in order to ensure maximum exposure to their work and lower the barriers for others to access research (Albert 2006). However, it is only recently that the open access movement has received wider support beyond these independent early adopters of open access practices (e.g., self archiving of research articles). Today an increasing number of professional associations, libraries and editorial boards of the major academic journals are actively advocating the adoption of open access policies and journals. The Scholarly Publishing and Academic Resources Coalition (SPARC) was launched by ARL as a constructive response to market dysfunction which reduced dissemination of scholarly information and crippled libraries and the scholarly communication system as a whole. SPARC focuses on enhancing broad and cost-effective access to peer-reviewed research by: (a) creating and developing alternative publishing

models to traditional journals; (b) promoting fundamental changes in the system and the culture of scholarly communication through ongoing communications and public relations activities; (c) developing campaigns aimed at enhancing awareness of scholarly issues and increasing institutional and community participation and control over the scholarly communication process (<http://www.arl.org/sparc/about/index.html>).

A preliminary examination of the major events related to the open access movement reveals some interesting patterns. During the period between 1989 and 2006, numerous editorial boards of academic journals published by the major publishers declared their independence from the publisher and resigned en masse from their journals, and subsequently established an alternative open access journal.⁴ Most of these journals were in the science and engineering fields with the exception of a few. Also during this period, an increasing number of funding agencies established policies to call upon their researchers to publish in OA journals and to deposit the articles arising from their funded research in an OA repository (Dewatripont et al. 2006). These include: (a) The US National Institutes of Health (NIH) which strongly encourages their funded researchers to submit their articles to PubMed Central no later than 12 months after the publication of results, with effect from May 2, 2005. (b) The UK Research Councils (RCUK) which funds research in all disciplines mandates grantees to deposit results of their research in open repositories at the earliest opportunity. (c) Wellcome Trust, UK's largest non-governmental funding agency of life sciences research which mandates grantees to deposit their articles within 6 months of publication. In addition, many other important research-funding agencies like CERN, CNRS in France, DFG and Max Planck Society in Germany are also encouraging their researchers to do the same and offer to pay the open access fees. In addition to such high-profile events, an increasing number of research institutions and libraries provided institutional repositories where members were encouraged to submit their research outputs. However, voluntary contributions to such repositories were limited. This led to initiatives to "establish institutional and granting agency mandates that would compel associated researchers to self-archive their published work" (Willinsky 2005).

Theoretical Framework

The preceding discussion has identified several key actors in the diffusion of open access practices. The decision to adopt open access research practices in the end rests with the individual researchers. However, the individual researchers are embedded in a complex web of institutional networks, belonging to both an employing organization and the academic discipline within which they conduct research. These exert both direct and indirect influence on researcher decisions. Employing organizations can range from non-profit research institutes and educational institutions to for-profit research institutes and can have varying policies regarding research output assessment that may include factors such as the impact factor of the outlet in which their work is published. The research grant agencies that provide the resources for conducting research will also dictate the research practices of individual academics. In addition, the researcher's network of collaborators and the academic discipline to which they belong will have various norms that affect individual research attitudes and behaviors. Each of these will have an impact on the researchers' awareness of and attitudes towards open access practices for research. Prior research has attempted to understand the reasons for the lack of open access practice adoption by focusing on the individual

⁴ See the list of Journal declarations of Independence maintained by Peter Suber. <http://www.earlham.edu/~peters/fos/lists.htm>

researchers' attitudes. These have focused on issues related to inertia in research practices, concerns regarding the perceived prestige and quality of OA journals and lack of awareness as reasons for not adopting OA publishing. In this study, we shift the analysis from the individual researchers to the entire inter-related web of relationships and organizational field that the researcher is embedded in. We adopt the model of institutional change of Greenwood and colleagues to examine how the actions and discourses of key players in the academic research institution of different disciplines will impact the diffusion of open access research practices (Greenwood et al. 1993; Greenwood et al. 1996; Greenwood et al. 2002). While theories of innovation diffusion may also account for the impact of some of these issues (e.g., theory of reasoned action) through the incorporation of the impact of subjective norms (Ajzen et al. 1980), in order to explain how a researcher may be influenced to different degrees by the norms and practices of the multiple groups and communities to which she may belong.

The model outlines the four necessary elements and conditions for change to occur in an institutionalized context. Change is triggered when the institutional actors with power experience dissatisfaction due to the misalignment of institutional norms and practices and their interests. In the context of academic research disciplines, editorial boards of journals, which typically represent the core group of reputed researchers within any academic discipline experience dissatisfaction with the traditional publishing model's prohibitively high cost and low public reach. However, dissatisfaction will not necessarily lead to an immediate adoption of new institutional practices. Change in institutional practices require that the key agents in position of power are not only convinced that the current practices are disadvantageous, but that they also perceive that the alternative new practices are consistent with their value structures and hence beneficial to their interests in both the short- and long-term. In other words, while the focal actors in almost all academic disciplines are likely to experience dissatisfaction with the current publishing models, it is only those academic disciplines whose value structure is congruent with that of open access research practices that will be successful in enacting the new open access research practices. The focal actors in the academic disciplines engage in various acts of *theorizing* to render the new open access practice "ideas into understandable and compelling formats" (Greenwood et al. 2002, p. 75); in short, focal actors will actively promote the diffusion of new open access practices only if they are compatible with their values and interests. In short, it is only when "ideas are couched in such a way that they are perceived to be consistent with prevailing values that they appear compelling and legitimate for adoption" (Greenwood et al. 2002, p. 75). We propose that editorial boards (representing the key researchers within the academic discipline), employing organizations and research grant agencies are the critical gatekeepers in this theorization process, and hence play the most critical role in the differential rate of open access realization across the academic disciplines.

Research Approach

The research employs a research design with comparative case studies of diffusion of open access in the science, medicine and technology disciplines as compared to the social sciences (Eisenhardt 1989; Yin 1994). We sample the cases so as to obtain a sample that spans a range of academic disciplines, employing organizations, and research agencies, that will enable an in-depth understanding of the role of attributes such as differences in the institutional structure of the academic disciplines. Within the academic disciplines, we sample fields that vary in the extent to which open access practices have diffused. We use measures such as the quantity and quality of the open access journal outlets available in the field as well as the extent to which individual researchers within the fields adopt open access research practices

(e.g., choosing open access journals for publishing, contributing to institutional repositories) to determine the extent of open access diffusion.

Data on the sampled cases will be collected from a variety of sources including web sites of the professional associations of the academic disciplines sampled, the directory of open access journals, institutional repositories and the editorials of journals within those disciplines. The process of data collection proceeds as follows. First, we use the information from journal impact factor data and the directory of open access journals to sample the academic disciplines of interest. Second, we identify key associated players in the respective academic fields as well as key players in the open access movement as identified through major offline and online open access publications. Next, we conduct keyword searches in Lexis-Nexis news database to extract all relevant news and announcements of the key events related to the sampled academic fields as well as key events related to the open access movement. Finally, we collect author (e.g., organizational affiliation) and article information (e.g., funding source) from both open access and closed-access journals for each of the sampled academic disciplines. The data collected will consist of both quantitative and qualitative data. The qualitative data are coded in iterative phases to develop a set of relevant codes to describe the key events and theorizing processes related to the diffusion of open access innovations. A priori content codes will be developed based on the model of institutional change discussed in the previous section. The analyses of the actors and events associated with different academic fields will enable us to provide a richer understanding of the diffusion of open access practices. Quantitative data regarding attributes of individual researchers, academic disciplines, employing organizations, and open access journals are used in exploratory event history models to examine which factors have most impact on the diffusion of open access practices.

Anticipated Contributions

While the importance of open access to research has been hotly debated in both the academic literature and the popular press, relatively little is known about the process through which open access research practices are spread and become institutional practices of specific academic disciplines. In this research we study the key actors and events involved in several different disciplines in the open access movement. By investigating the differences across the successful and unsuccessful cases of the adoption of open access practices by different academic disciplines, we hope to shed light on the process through which open access practices are adopted and the role that the prevailing institutional and disciplinary values with respect to intellectual property and the norms of open science play in this process. In addition to the practical implications for the key stakeholders in the open access movement such as the policy makers in research funding agencies, academic associations and employing organizations, this research-in-progress will shed light on how new organizational practices emerge and become institutionalized. In particular, the data from the cases will examine how the bottom-up decisions by individual researchers regarding the adoption of open access practices within an academic discipline are influenced by top-down initiatives mandating open access, depending on factors such as the structural position and associated legitimacy within the academic discipline. Finally, in the face of the increasingly interdisciplinary nature of academic disciplines, where researchers may occupy positions that are different from their degree-granting academic field, an interesting issue for further research is the impact of such multiple professional identities on the adoption of open access practices.

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