



Back to the Beginning – The Journal is Dead, Long Live Science



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ABSTRACT

This paper synthesises literature on the evolution of the academic journal, showing that the weaknesses of the journal strategy of science information dissemination are nothing new in the history of science. The paper avers that information technology has provided a solution to the age-long constraints associated with the journal. It is shown that by expanding the public's participation in science, and by enabling research results to be presented to the public in various formats, the rapid development in electronic technologies has touched the essential structure and functions of the journal. Formal and informal means of science dissemination and communication have emerged to blur the boundaries between journals, articles and ideas. Most significantly, the journal as an information product has been dismembered into different new and legitimate forms of the research effort, formerly packaged as a single product.

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INTRODUCTION

The journal is dead, long live the journal. This is precisely the title of Danny Kingsley's paper which highlighted the transformations in scientific publishing, marked by movement from the traditional print journal model to the electronic format (Kingsley, 2007). Kingsley posited that this change would have tremendous impact on scholarly practices. According to Kingsley "What form these future journals will take will depend largely on technological developments over the next few years, but already we are seeing aspects of the traditional journal being undertaken in unconventional ways" (Kingsley, 2007: 1).

Prior to Kingsley's study, Harnad (1987, 1990) had envisaged and eulogised, in his "skywriting" essays, the emergence of an electronic technology-based alternative to the traditional journal, a change that would take scholarly research papers away from the hands of the academic publishers to place them in institutional repositories. Harnad discussed the pre- and post-publication review practices and other advantages that skywriting would promote. Also, Roosendaal and Guerts (1998), Odlyzko (1995, 2001), Van de Sompel (2004) and a host of others have shared their opinions and findings about the future of the traditional paper journal. Odlyzko (2001) observed that the print journal is inefficient, expensive and inflexible, and based on Christensen's (2000) notion of disruptive technologies, he suggested that the use of the web approach to publishing will result in authors winning "more eyeballs" (Odlyzko, 2001: 13) than they did with the closed access model.

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There are many opinions about the type and scale of the changes in scientific publishing that a move to the World Wide Web would cause. Harnad's (1996) description of how peer review could be implemented on the net represents a significant suggestion on the role of WWW in science communication. In 1997, Ginsparg discussed the overlay journal, which would perform only certification functions, that is, peer-reviewing materials that are already published, archived and registered in an external repository, and create access to published articles through a simple link. In this paper, Ginsparg observed a possible redefinition of the filtering and recommendation roles observed in the traditional academic journal. Based on the subject-focused nature of scientific information dissemination by science, technology and medicine (STEM) journals, Smith (1999) described the deconstructed journal in which the researcher, the publisher and the reader utilise information technology to achieve quality, spread and access to research papers. Prior to Smith's paper, Swinnerton-Dyer (1992), Bailey (1994), Odlyzko (1995) and Savenije (1997) described various possible forms of an electronic journal.

Although Russell and Rousseau's (2002) study focused on the impact of institutional evaluation, they mentioned that the internet has shifted emphasis from the journal to the individual article. Of interest to them is the observation that, in the digital age, scientists may have access to each paper individually without having to view the entire issue or volume of the journal. In their own study, Lozano, Larivière, and Gingras (2012) also observed that in the digital age, scientists have the privilege of accessing each paper individually without having to view the entire issue or volume of the journal. More recently, Priem and Hemminger (2012) discussed the decoupled journal in which they observed that most of the functions of the journal such as archiving, preparation and certification, which together resulted in a single product known as the

journal, are all already being handled as specialised individual services. They suggested that these services are already resulting in outcomes that are also shared with the scientific communities, in addition to the journal itself.

Like Harnad's skywriting, many of the opinions retain the concept of the traditional journal, but touched on either the location of the journal from manual to electronic format, domiciliation and control of research papers from the publishers to institutional repositories or the unbundling of the essential functions of the journal. Further observations have also been made on the impact of these developments on the relationship between the impact factor and papers' citations, and not on the journal as a container and carrier of scholarly information (Russell & Rousseau, 2002). Both Bailey and Ginsparg described systems that could help in accessing specific sources and not necessarily a network of sources, while the deconstructed journal in which most of the functions of the journal are decoupled is a very significant reference to the possibility of the emerging role of information technology to transform the nature and role of the journal (Smith, 1999). These authors and many more recognise the revolution that has been initiated in science communication by the WWW; but their models were based mainly on the transfer of the traditional journal into the WWW. They did not discuss the possibility that the journal as an information product itself, consisting of a collection of research papers and related information, would someday be split into smaller useful units that benefit various segments of the public, thus blurring the meaning of the traditional journal for science.

This paper synthesises the emergence and constraints of the traditional journal in science communication, and the transformations consistently taking place around the concept of the journal. It highlights the way that the birth of electronic journals in the middle of the 20th Century actually addressed the concerns now being expressed by researchers/authors about the limited capability of the journal to take scientific information to the public. This paper links these observations with the modern open access publishing regime, showing that the open access mission to promote free flow of scholarly information from researchers/scholars is finding fulfilment through the revolutions of electronic technology. Teasing these developments together, the paper suggests that the versatility of the WWW to share artefacts prior to, during and after completion of a research undertaking has rendered the traditional journal both in physical and electronic format a partial container of research information.

THE MODERN ACADEMIC JOURNAL

Here, we highlight scholarship practices in the 17th century and the emergence and regime of the modern traditional journal. Early philosophers were mainly observers, and they shared their observations through word of mouth and, much later, through hand-copied letters (Thurston, 1994; Cronin, 2005; Solomon, 2013). As would be expected, hand-copying of texts was cumbersome and inefficient, despite the limited number of philosophers at that time (Guédon, 2001). The idea of the printed journal as well as the book came with the expanding role of the printing machine, which pointed to the possibility and benefits of packaging larger volumes of information at the same time, more than the hand-copying strategy could afford (Schaffner, 1994; Education Policy Analysis Archives, 2012).

Generally, books were developed to carry non-expert information aimed at education and enlightenment, and they provided a comprehensive and permanent means of presenting, summarising and interpreting ideas, theories and opinions (Blake & Bly, 1993). Until the middle of the 20th Century, books were not made available in bound copies; rather they were made available as stacks of loose sheets. The buyer hired a book binder to bind the pages together.

The journal, by contrast, was initiated to circulate discrete, expert and current findings of various philosophers in one package, being less bulky, narrow and very specific in focus in comparison with the

book. Journals were required for quick learning about the recent work of others and for sharing new work with the wider world, and much later, for establishing priority over other scientists working on the same problem (Kolata, 2013). Journals are generally timelier than books; readers would also find it easier to read a few papers at the same time (Avrin, 1950). Hence, authors who wanted a fast and public time-stamp on the outcomes of their research would use journals. Collecting a few research outcomes and circulating them to readers soon became recognised as a quick and fruitful means to disseminate scientific information to the public (Maynard, 1956).

Apparently therefore, the journalisation of science was necessitated by the imperative of deploying technology to improve scholarly information circulation (Hendler, 2007, 2008). Authors particularly were envisaged to be satisfied with the fast public time-stamp their work received through printed journals. Generally, the journals were circulated in the same spirit of early philosophers' practice of sharing information without any profit motives; they accepted the symbolic reward of having contributed to knowledge as sufficient profit for their labours. However, the journals were sold to recover costs (Hendler, 2007, 2008). Authors knew that the journal revenue accruing to the publishers was insufficient to pay them for their labour (Hanard, 2009).

Ever since the emergence of the academic journal, its role in organising science has been monumental (Einatien, 1979; Onburn, 1984; Subramanyam, 1981). The role of the journal in ingraining and structuring science and the science communication ethos through formal institutions such as editorial boards and peer-review panels, and the lack of a viable alternative communication channel for science account for the enduring strength of the journal (Jange & Kademani, 1999). However, from the early 21st Century, the traditional journal strategy of science communication has been heavily criticised as being incapable of meeting the expectations for speedy and cost-effective sharing of research papers.

THE INEFFICIENCIES OF THE TRADITIONAL JOURNAL STRATEGY IN HISTORICAL PERSPECTIVE

About three centuries after the journalisation of science was initiated, scholars started making strong observations about the unsuitability of the journal as a medium for science communication. One of the earliest critics was Allen (1922) who observed that the journal was delaying circulation of scientific papers, posed restrictions on length of papers, required too much refinement of information and was bypassing relevant numbers of the public. He also observed that the journal facilitated scattering of papers in many journals and that the cost of acquiring journals by individuals, societies and libraries was becoming prohibitive. Allen also observed that the journal strategy of science communication was wasting scientists' time in editorial work and peer review, among others. Allen attributed these constraints to the journal most probably because the academic publisher at that time was considerably modest in terms of cost, and was also appreciated and respected by researchers, having not become as highly profit motivated as today. As an alternative, Allen suggested that instead of journals, mimeographs of scientific publications or their rendering in other formats than the journal could be placed in repositories for ease of access for those who need them.

In 1957, Coblans, who was at that time the Head of the Scientific Information Service for the European Organization for Nuclear Research in Geneva, reviewed the studies that focused on the weaknesses of the periodical strategy. Specifically, he referred to Bernal's (1948) presentation at the Royal Society Scientific Conference in the US where Bernal recognised the inefficiency of the prevailing method of distributing scientific information and called for a cheaper and more rapid system. According to Coblans, Bernal's opinions were heavily opposed, and the major critics were members of the scientific and professional societies. For their own part, the American Association for the Advancement of Science (AAAS) also observed that the existing system of publication

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