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# Open Journal Systems: Open Source Journal Management and Publishing

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## Abstract

### Purpose

To provide an insider's review of the journal management and publishing software, Open Journal Systems (OJS), from the Public Knowledge Project, at the University of British Columbia. The paper outlines the history, development, and features of OJS, including some of the experimental aspects, as well as early research results and work underway on which it is based. Open Journal Systems is an open source solution to managing and publishing scholarly, peer-reviewed journals online. It can reduce publishing costs compared to print and other traditional publishing processes. It is a highly flexible editor-operated journal management and publishing system that can be downloaded for free and installed on a local Web server.

Keywords: Software, publishing, journals, open access,

## INTRODUCTION

Open Journal Systems (OJS) was originally developed as part of the research program of the Public Knowledge Project (PKP) out of the University of British Columbia.[1] PKP had its origins in the mid-1990s in research efforts aimed at designing knowledge management systems that would increase the contribution that educational research made to the lives and work of teachers, administrators, policymakers, and the public. In a series of projects, PKP represented an early effort to take advantage of the initial, heady days of the Internet, when this brave new World Wide Web promised to open the doors to all of the knowledge that had been previously available only in research libraries.

However, we found that the problem with enhancing the quality of public knowledge was not that educators were too busy with teaching or that policymakers were too caught up in local politics, or that the public was simply indifferent to research in their endless thirst for infotainment. The problem was the academic community, and its failure to make what it had learned publicly available. The question we needed to answer, therefore, was whether access to research could be increased and improved via the Internet.

Soon after we turned toward the question of how access to scholarly journals, which were on the whole guarded heavily by high subscription rates, could be improved. The two processes we saw as available were to either have authors self-archive their work, or to move journals into open access publishing. With this last option, we were confronted by the question of what it cost to run a journal online and whether the savings on online management and publishing, if any, could form the basis of running the journal under some form of an open access model. So the next issue was to tackle what it cost to publish a journal in the first place in order to fairly estimate the whether there were any benefits to going Open Access to scholarly communities. As we found, though, there were far too many answers to the question, with huge differences among the answers. In other words, the costs of some journals were higher than others.

The inquiry certainly got off to a good start. There was much literature about online journal costs. More importantly however, we heard back from Gene Glass, who had founded *Education Policy Analysis Archives* (EPAA) in 1993 as a "born digital" peer-reviewed journal. Glass was blunt and multilingual about his business model, when it came to describing his operating costs: "Zero, *nada*, no budget, no grad assistant, no secretary" (personal communication, October 21, 2001). EPAA, I should add, is an online peer-reviewed journal that receives some 2,500 unique visitors a day from 70-80 countries (Glass 2003).

In our research, however we found a small group of electronic journals that were spending in the area of \$20,000 a year. For example, the *Electronic Journal of Comparative Law* had had its books reviewed by the accounting firm PricewaterhouseCoopers, which calculated that the Dutch open access quarterly was costing \$20,084 annually (Bot, Burgemeester, and Roes. 1998; also see Fisher 1999; Integration, 2002). A similar annual figure comes up with the BioMed Central journals, as a result of adding up the author fees it collects of \$525 per published article (for most of its 100 or so open access journals although a few charge more). Some journals contract out their e-journal edition, and Highwire Press, at Stanford University Library, was initially charging between \$35,000-125,000 to set up electronic journals, with ongoing operating fees for the e-journal of several thousand dollars a month (Young 1997). Finally, Reed Elsevier estimates that it has spent \$360 million developing ScienceDirect, which hosts electronic editions of its 1,800 journals, with a continuing investment of \$180 million for “developing new technologies” (Davis 2004).

With this evidence of the breathtaking range in differences in cost for open access publishing, the question of what it could end up costing to move a journal online open access would seem to discourage all but the diehard risk-takers and do-it-yourself adventurers from considering the open access model in making the move from print to online publishing.

What if, we wondered, we could control one part of publishing’s financial model by reducing the journal’s software design and development costs to close to zero? We could do this by creating *open source* software that was specifically developed to manage and publish journals online. The software could be designed so that it called for no greater technical skills on the part of journal editors than were commonly found among university faculty today, namely word-processing, emailing, and Web-browsing. This software could also keep publishing costs down by taking advantage of the technical infrastructure and server capacity already in place in most university libraries.

The open source model was proving itself with the software Eprints.org, developed at the University of Southampton. It was also proving itself the well-established alternative route with the operating system Linux, otherwise known as “the impossible public good” (Smith and Kollock 1999, 230). Indeed, the academic community continues to play a vital role in open source software development, following on Linus Torvald’s beginnings with Linux in his work as a graduate class project in Finland. More recently, the Sakai cooperative has been formed among 44 institutions and is devoted to developing open source course management software, with the support of the Mellon Foundation and Hewlett Foundation (Young 2004).

In November of 2002, 18 months after software development began on the journal software, Open Journal Systems (1.0) was launched. OJS was built with support from the Social Sciences and Humanities Research Council of Canada and the Pacific Press Endowment at the University of British Columbia, with further support coming from the Max Bell Foundation, and the Catherine and John D. MacArthur Foundation. The funding was provided in the context of *research* and *development*, with the software development following a range of related research projects, from policymakers’ use of open access research to the potential of open access to contribute to the research capacities of universities in developing countries (Willinsky, in press). The software development took shape out of this work, and I would estimate that the amount devoted to software development is now over \$100,000, and continues apace with upgrades to Open Journal Systems.

The better part of development expenses went into creating a system that was more than user friendly. It was designed to offer journal editors all of the necessary options required by the varying editorial standards followed by different disciplines, from journals in which authors select the editor to whom they wish to submit, to journals where multiple rounds of review by the same reviewers are standard. OJS is also carefully set up to assist those who have little enough experience with journal publishing.

And this is important in the larger picture because establishing a new journal or helping a fledging one find its feet can, after all, support the development of local research and review capacities in areas of higher education where that has not been part of the academic culture, because of a lack of opportunities to participate. Too often, universities foster the attitude that work must appear in the highest ranked journals to count for anything. But without a series of intermediary steps up that steep academic ladder, and without journal experience with reviewing and editing, scholarly publishing can become an all-or-nothing career game that does little to foster opportunities for a new order in the global circulation of knowledge. The easy portability and use of OJS is intended to serve that larger global goal.

Now that OJS has been in use for over two years, we have drawn on the experiences of many editors to continue to increase the flexibility and possible configurations of the system. It is currently being used, in whole or in part, in its original or modified form (it is open source), by over 250 journals to manage and publish online. OJS is also supported by contributions coming in from around the world, in the form of bug fixes, translated files for OJS (it is now available in five languages), and a subscription module, with an active Support Forum with close to a hundred registered members. There are journals using OJS to reduce the expenses for

subscription journals and open access journals in the humanities, for example, that follow Gene Glass' zero-budget tradition of scholarly publishing by relying on skilled volunteers for all of the critical roles in the publishing process (like editor, copyeditors, layout editors, and proofreaders) which are not about to be automated by systems like OJS.

## INSTALLATION

OJS is designed to cover all aspects of online journal publishing, including the setting up of a journal Web site; the handling of the author's submission through peer review, and editing; the management of issues and archives; the indexing and search capacities of the journal. The software can be downloaded from the Public Knowledge Web site and installed on a Web server with a Linux, Windows, or Unix operating system, running Apache, PHP and the MySQL database. This download-and-install approach is intended to enable local control of journal publishing, while still operating within a distributed system for indexing and system development. Most journal management systems provide a centralized hosting as part of their service contract, adding to the cost of operating the journal. More than a few of the journals using OJS have the software hosted on a university library or other institutional machine, in light of the benefits it gains from the growth of open access to research and scholarship. In the case of Africa, for example, UNESCO has agreed to host African journals using OJS as part of its African Network of Scientific and Technological Institutions program located in Nairobi.

Once OJS is installed on a local server, it can be used to generate any number of journals from that site. Once a journal is created on the server, it is ready to be configured by the journal manager or editor who can do this by simply filling in a series of templates in the Setup section of the journal. The templates cover the journal's basic details (title of the journal; principal contact; sections of the journal, etc.), as well as providing a place to post and manage journal policies, processes, and guidelines. Through this process, OJS creates a customized Web site for managing and publishing the journal. With the Web site in place, authors can submit their work directly to the Web site; editors can drop in to journal's workspace at the airport, using their laptops to oversee the review process; reviewers can pick up assigned papers and post their reviews; accepted papers are edited, laid out, published, and indexed all on the site. OJS is designed to enable a single editor to manage a journal and the journal's Web site. It can also support an international team of editors, with shared responsibilities for a journal's multiple sections.

The Web site that OJS sets up serves as an editorial office for the journal, while the system sees to the labeling, filing, and tracking of all submissions, provides a work space for editors, reviewers, copyeditors, layout editors and proofreaders, as well as a workflow process for submissions that moves them through each of the necessary steps, ensuring that they each land on the right desktop at the right time in the editorial process. So when it comes to calculating the savings from using such a system, one can begin with real estate, and the prospect of not having to maintain an editorial office, with all of the associated furniture and overhead. Or if one already has such an office, there is the prospect of a sub-let revenue. There may be no bottle of wine in the OJS cupboard, but the virtual online editorial office is always open, always available with a complete set of records and materials, and can be reached from any computer that can form an Internet connection.

## THE EDITORIAL PROCESS

OJS is intended not only to assist with journal publishing, but is also designed to demonstrate to editors how the cost of journal publishing can be reduced to the point where providing readers with "open access" to the contents of the journal may be a viable option. OJS reduces the clerical, management, and publishing costs of journals. This was a necessary first step, of course, if there was to be any hope of journals being able to make their contents free for readers through some form of open access.

OJS management systems are structured around the traditional journal workflow required to move a submission through reviewing, and if accepted, editing and publishing, with records maintained of who is doing what and when. OJS uses a prepared set of emails to contact the necessary people at each step, whether author, editors (managing, section and layout), reviewer, copyeditor, or proofreader. These emails, which are used to coordinate processes among editors, authors, reviewers, etc., contain the necessary information for each submission which is automatically filled in. The email can be personalized by an editor prior to sending, except in such cases as automated reminders.

To take an example of how a journal management system such as OJS works in action, consider the most common task of an editor, namely, assigning two or more reviewers to evaluate a manuscript for possible publication. The editor logs onto OJS through her Internet browser, whether at the office, home, or airport (a cell-phone version of the program has yet to be created). On entering the journal's Web site, the editor first comes to a table that sets out the current state of her assignments, with some submissions awaiting an overdue

peer review, and others that have just arrived and need to have peer reviewers assigned to them. With the new submissions, the system has already notified the authors with a standard email indicating that the manuscript was successfully uploaded to the journal, and inviting them to log in to check the progress of their submission.

The editor goes to the Submission Review page for one of the new submissions and takes a look at the paper by downloading it to see if it is suitable for the journal and ready for review. Once satisfied on that count, the editor then clicks a Select Reviewer button. This takes the editor to a list of reviewers that indicates their areas of interest, the date their last review was assigned and completed, as well as how many reviews have been completed. The editor scrolls or searches for a suitable reviewer, or decides to enter a new name, before clicking the Assign button. The Assign button causes a window to appear, containing a prepared email, addressed to the reviewer from the editor. This email presents the paper's title and abstract and invites the reviewer to visit the site and download the paper (or if the editor chooses, the submission is sent out as an email attachment).

Once the editor sends the email, the name of the reviewer, along with the date the invitation was issued and the deadline date for the review are recorded on that submission's Review page. All this can be accomplished in the time it might otherwise take to ask an editorial assistant to check when a certain colleague had last reviewed for the journal. The editor then moves on to select a second and possibly a third reviewer for the submission. And while the editor will devote whatever time saved, and then some, to assessing the reviews and providing helpful advice to the authors, the process outlined here needs to be compared to Fytton Rowland's determination that the current average cost of peer review process for journals is \$400 per published paper (2003).

The publishing options for the journal using OJS include the full range of article formats, including PDF, HTML, and Postscript. The careful formatting and layout of these articles is not something, as noted above, that OJS has automated. The preparation of the galleys in one or more publishing formats must be done by someone who has the appropriate skills and access to the software (e.g., Adobe Acrobat). As with copyediting and proofreading, there are no shortcuts for these steps when it comes to producing quality copy for the journal. What OJS does, however, is allow resources to be concentrated on such tasks, by taking good care of the ordering, alerting, and organizing of these processes.

OJS can publish the contents of the journal in a standard issue format, with 10-12 items, or the editors can decide to publish each article as soon as it has completed the editorial and layout process. This continuous publishing approach is something which journals are doing more often now, taking advantage of the new technology, rather than slavishly following what are becoming the anachronisms of the earlier form (when it made economic sense to bind articles together and *issue* them in a set).

## JOURNAL INDEXING

On submitting a paper to the journal's Web site, the author is asked to provide the appropriate indexing information or metadata. This does mean additional work for the author, but compared to the old days of just a few years ago when an author making such a submission had to make multiple copies, prepare a letter, and post it to the journal, it results in a saving in time, energy and cost (if somewhat offset in developing countries by the price of using an Internet café which faculty members often have to do). The principle at issue is again one of moving energy from clerical tasks to those that contribute to the quality of the published work. Thinking about the indexing of one's work does that, compared to photocopying it, as it gets authors to think about how they position their work within the larger field. Of course, professional indexers and cataloguers would do a far better job of classifying a work than most authors. However, increasing access to the research literature entails increasing access to indexes and in light of what indexing services charge libraries, there exists a need for an alternative to professional indexing, especially for universities in the developing world (Willinsky, in press).

The actual extent of author indexing is a somewhat experimental aspect of OJS. The editors can determine which indexing elements or metadata to include in their journal, and they can provide authors with relevant examples from their own field (with links to classification systems or a thesaurus) to guide the indexing process. The indexing in OJS adheres to the Open Archives Initiative Harvesting Protocol, which is based, in turn, on the Dublin Core Metadata Initiative that utilizes 15 elements. OJS supports an extended form of the Dublin Core, allowing journals to have authors index, for example, characteristics of research subjects (such as age and gender), as well as index the research methodology or method of analysis used by the work. As the Web grows and the research literature along with it, greater precision of indexing can provide some protection against the threat of sheer information overload. One reason for thinking that research libraries are good places to have journal systems like OJS hosted is that the library is also the home of indexing and information science expertise which could contribute to this aspect of publishing, if only by occasionally reviewing authors' indexing patterns, and providing useful advice and guidance. The goal is to afford more readers accurate searching among electronic research resources, without completely eliminating serendipity. It is also a way to create more

inclusive and immediate indexing than is otherwise available from commercial indexing services (Willinsky and Wolfson, 2001).

## READING TOOLS

A second experimental aspect of OJS has been focused on improving the design of the reading environment which online journals create for the content they publish. It is true that the most common way of reading articles found online is still to slide the cursor over the print button. However, readers are slowly discovering the advantages of reading online, even as the quality of screens and the portability of the machines improve. Our goal is to take advantage of online resources and tools to improve the quality of critical engagement with this literature while it is online. These improvements have to be made, however, without adding significantly to the journal's costs or the editor's workload – given the exigencies of open access publishing and archiving – and they cannot get in the way of the primary readership of the journal, the researchers themselves, even as these tools provide additional support for less experienced readers of this research (which was the original impetus of the Public Knowledge Project).

In seeking to improve the reading environment, we have turned to the research on learning how to read. And we set out to build on the excellent model established by Highwire Press, PubMed and others sources, by extending the typical set of links which these systems provide for each article with the aim of creating a richer context for reading journal articles. The Highwire journals, for example, provide support for expert readers, whether with links to related articles in the same journal or to works by the same authors. We set out to build Reading Tools, as we call them, that would assist the wider range of readers who will follow on the heels of open access. [2]

The Reading Tools sit just beyond the margins of the article, looking much like a traditional paper bookmark (see Figure 1). At this point, we have developed 20 sets of Reading Tools to cover as many of the academic disciplines and broad fields as possible, depending on the availability of open access resources and databases. Each set typically provides readers with 10-15 links to other open access sites and databases. The journal's editors can reconfigure the Reading Tools to direct readers to further relevant sources. Figure 1 presents one of the current prototypes for the Reading Tools, using the article introduced earlier from the field of education as its example.

The screenshot shows a web browser window displaying an article page from 'Open Journal Systems Demo Journal, Vol 1, No 2 (2005)'. The page has a navigation menu at the top with links for HOME, ABOUT, LOGIN, REGISTER, CURRENT, ARCHIVES, and SEARCH. Below the menu, the breadcrumb trail reads 'Home > 1.2 (2005) > Rogers'. The main content area features the article title 'Understanding in the Absence of Meaning: Coming of Age Narratives of the Holocaust' by Theresa Rogers, University of British Columbia. An 'Abstract' section follows, describing a working paper on teaching the Holocaust through literary representations. Below the abstract is an 'Introduction' section. On the right side of the page, there is a sidebar titled 'OJSDJ 1.2 (2005)' containing a 'TABLE OF CONTENTS' and a 'Reading Tools' section. The 'Reading Tools' section lists various actions such as 'For this peer-reviewed article...', 'See the author bio', 'Capture the citation', 'View item's metadata', 'Go to print-version', 'Look up a word', 'Send link to colleague', 'Add comment to item', 'Email the author', and 'Be notified when...'. Below these are 'Find related items among...' and a list of categories like 'Research studies', 'Author's other works', 'Dissertations & theses', 'Press & media reports', 'Government websites', 'Instructional resources', 'Discussions & forums', and 'A Google Web search'. A 'CLOSE' button is located at the bottom of the sidebar.

Figure 1. Reading Tools for use with OJS journals in the field of education

While we have only begun testing whether such tools can help a wide range of readers read research, the initial responses to the tools from readers in the design phase have been positive (Willinsky 2004). Our studies are focusing on whether the tools can contribute to comprehension, evaluation, and utilization of research among the public, related professions (such as teachers and physicians), policymakers, and researchers.

The Reading Tools in the design shown here start off by answering a question that troubles many readers of information online, as it identifies whether the article being read is *peer-reviewed* or not, with a hyperlink to an explanation of what the peer-review process is about. Also close to the top of the Reading Tools is a link that reads *View the item's metadata*. A click on it reveals the study's indexing information, including as discussed above, its discipline, keywords, coverage, method, and sponsor. This addresses another concern identified in the research on reading, namely that inexperienced readers have difficulties identifying the significant concepts – separating core ideas from the noise – around which to associate related points and arguments (Alexander, Kulikowich, and Jetton, 1994). Then, moving down the Reading Tools, with *To look up a word*, readers can double click on any word and send it to one of two free online dictionary services.

There is also a set of links for finding items that are related or relevant to the article being read. These include *Author's Other Works*, *Research Studies*, and *Online Forums*. To click on one of these presents the reader with a choice of relevant open access databases. With *Author's Other Works*, for example, the author's or authors' names are fed into an open access database, such as ERIC (the U.S. federal government's Education Resources Information Center) in the field of education, with abstracts or articles and lists these other works in a window for the reader to consider consulting. With *Research Studies*, and *Discussions and Forums*, the relevant open access databases that we have identified in advance are searched using the first two keywords provided by the author of the article to ensure relevant materials come up. Before any search, the reader can change the key words provided by the author to further focus the search. The reader can then use the articles that come up from search for related studies or author's other works as points of comparison or studies to pursue in themselves. Through the *Press and Media Reports* and *Government Web Sites* links, readers are also led to see that the context for reading research is not always other research, but can be other relevant public materials that give a contemporary and applied context to the work being read.

Now the risk with such reading tools is that the reader will be overwhelmed or at least sufficiently distracted that the value of access to this research will be diminished. This may be all the more so for those with little experience reading this material, while the expert will see it as no more than another nuisance associated with online reading. Our preliminary investigations with policymakers and complementary healthcare workers suggest that it provides them with a greater sense of the research's value and contribution to their understanding. Still, as we say in this business, more research is needed on the reading of research, especially in light of this new openness. What should be clear is that reducing publishing costs and enhancing publishing efficiencies is only part of the case for a system such as OJS, just as toll-free access should be only part of the case for open access to research and scholarship. What is no less important in both cases is using what we know about reading and publishing, about access and learning, to extend the circulation of this knowledge.

## CONCLUSION

In terms of where Open Journal Systems is headed, version 2.0 is about to be released as representing the 10<sup>th</sup> upgrade of OJS. It can now support multiple journals from a single site, as well as offer PDF searching, complete Help manual, multiple rounds of reviewing, automated reminders, reviewer ratings, and a host of other features. But more important than that, as a result of an agreement reached in January of 2005, the continuing development of Open Journal Systems is now overseen by a partnership among UBC's Public Knowledge Project, the Canadian Centre for Studies in Publishing, led by Rowland Lorimer, and the Simon Fraser University Library, directed by Lynne Copeland. The goal for the Simon Fraser University Library is to provide a hosting and publishing support facility for journals wishing to subscribe to such services, while the Canadian Centre for Studies in Publishing will provide training.

At the same time, however, we remain committed to developing the open source and stand-alone qualities of Open Journal Systems for use world wide. We are particularly concerned with improving the contribution of such systems to university research capacities and culture among developing countries, as well as support the public quality of open access (two elements of access missing from the self-archiving open access program). We are also interested in technical issues involving the greater use of XML for supporting citation indexing and multiple output formats, as well as improving compatibility with related systems, such as institutional repositories.