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RESEARCH

Scholarly Communication as a Core Competency: Prevalence, Activities, and Concepts of Scholarly Communication Librarianship as Shown Through Job Advertisements

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INTRODUCTION The dynamic nature of the scholarly communication landscape has produced a need for the creation of positions specifically focused on these issues. Yet, no clear title or job description for scholarly communication librarianship has emerged. The lack of standardization in this area is problematic for educators, professionals, and prospective professionals. **METHODS** Analyzing 13,869 job advertisements published between 2006 and 2014, this study attempts to examine the prevalence of scholarly communication terms and activities and the types of positions in which these terms and activities appear. **RESULTS** This study finds an increase in the use of the term "scholarly communication" in the title or text of job advertisements over the last nine years, with more than 7% of positions in the most recent year containing the term. **CONCLUSIONS** An analysis of the levels of engagement with scholarly communication demonstrates that jobs with substantial levels of engagement are increasing; whereas those requiring passive knowledge or awareness of scholarly communication issues are decreasing. Jobs with scholarly communication as a primary job responsibility are differentiated by a focus on repositories, open access, copyright, authors' rights, and intellectual property differentiate core scholarly communication positions.

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IMPLICATIONS FOR PRACTICE

1. This study provides empirical evidence for the growth in scholarly communication responsibilities within librarianship since 2006.
2. This study should be of interest to library directors launching scholarly communication programs or already overseeing them, to library school deans engaged in keeping curricula up-to-date with the realities of the job market and to future librarians training to enter the profession.
3. This study can help library school educators adequately prepare students for the job market, as well as aid those students in identifying emerging career options in academic librarianship.

INTRODUCTION

In 2010, the Association of College and Research Libraries (ACRL) identified scholarly communication as a top trend in academic librarianship, noting the following developments in librarianship: growth in open access/source products, growth of locally-created digital collections, increase in the complexity of licensing issues, and litigation involving use of course reserves. In response to these pressures, libraries have created new positions or modified existing positions with a focus on scholarly communication:

> Scholarly communication competencies are increasingly called for at two levels in research libraries. First, many such libraries are creating specialist positions for expert practitioners who will lead in developing programs and services to support scholarly communication. Second, we are seeing a heightened expectation that librarians who support disciplinary scholarship are fluent in the language of scholarly communication and can address its opportunities and challenges. Scholarly communication literacy has become a core competency for academic librarians. (Bonn, 2014, p. 132)

This relatively rapid involvement in scholarly publishing and related activities, and the dynamism of the domain, has led to ambiguity in what constitutes scholarly communication librarianship. For the purposes of this paper, we will utilize the definition of scholarly communication provided by ACRL, although many other suitable definitions exist to describe this complex system:

> Scholarly communication is the system through which research and other scholarly writings are created, evaluated for quality, disseminated to the scholarly community, and preserved for future use. The system includes both formal means of communication, such as publication in peer-reviewed journals, and informal channels, such as electronic listservs. (ACRL, 2003)

The extent to which libraries are investing money and personnel into components of the scholarly communication ecosystem is something that should be of concern to all stakeholders. Job advertisements provide a useful lens for investigating these issues. These texts implicitly describe the landscape and prioritized activities across time. Such data can be useful for library managers engaged in strategic planning, for educators training the next generation of professionals, for those entering the profession, and for researchers studying scholarly publishing and the history and philosophy of science.

This paper reports the results of a study examining ALA JobList postings from 2006 to 2014, with a focus on those positions requiring scholarly communication responsibilities. We sought to understand the extent to which scholarly communication jobs are becoming available, the skills that are required for these jobs, and the degree to which these skills are found in other jobs.

Specifically, we investigated the following research questions:

1. How prevalent are jobs referencing scholarly communication in the job text or title? Has this increased over time?
2. To what extent are scholarly communication activities listed in job advertisements?
3. What types of job titles are associated with scholarly communication activities?
4. What concepts are highly represented in scholarly communication job advertisements?

LITERATURE REVIEW

Scholarly communication job responsibilities in academic libraries

The evolution of the library's role in scholarly communication is most often discussed in the context of library relationships with faculty projects (Vandegrift & Varner, 2013) and with technology and the changing practice of scholarly communication (Shearer, as quoted in Clobridge, 2014). Library administrators have often distributed these responsibilities to existing units, rather than assigning them to a newly-created unit (Kirchner, 2009; Mullins et al., 2012; Thomas, 2013; William, 2009). In smaller institutions, scholarly communication initiatives may be "more likely to be led by a single person, and much less likely to be led by a library unit" (Thomas, 2013, p. 168). Although Burpee and Fernandez (2014) concluded that organizational structure and leadership are essential drivers of scholarly communication initiatives (p. 16), a survey of ARL member libraries found that no single leadership model was predominant, as a mixture of single librarians and committees was responsible for steering initiatives (Radom, Feltner-Reichert, & Stringer-Stanback, 2012, p. 11).

Scholarly communication duties can vary, including scholarly publishing services, copyright and open access (OA) advocacy, scholarly resource assessment, data management, collection development, copyright advising, or information literacy (Calarco & Ruttenberg, 2014), but many researchers view outreach as an essential job responsibility for the scholarly communication librarian, particularly via "digital materials and live presentations" (Wright, 2013, para. 7). Malenfant (2010) describes integrating scholarly communication advocacy into liaison librarian responsibilities at the University of Minnesota, noting that "engaging library staff to carry out the various components of the outreach program plan is a key element to its success" (p. 63). An ARL template intended for libraries advocating an open scholarly communication position listed eight responsibilities for scholarly communication librarians: leadership and management, education, liaison coordination, faculty awareness programs, cultivation of faculty allies, active continual learning, initiatives to aid faculty in negotiating authors' rights, populating the institutional repository, and acting as spokesman at the university, system, state, national and international levels (Stemper, 2014). The eagerness of libraries to support the OA movement through advocacy may mean that outreach and liaison librarians may see increased involvement in scholarly communication initiatives.

Scholarly communication education for librarians

While academic libraries are busily assigning scholarly communication duties to existing units or job descriptions, or creating entirely new scholarly communication librarian positions, library schools seem not to be undertaking analogous curricular changes. Bonn remarks that it is "clear that we are at a moment in the library profession that calls for expansion of education and training…that can and should be undertaken by library and information schools and through professional development" (Bonn, 2014, p. 135). Given the rising number of jobs requiring knowledge of scholarly communication and the ability to implement scholarly communication initiatives, it is striking that scholarly communication has not been widely integrated as a core component of library school curricula: 73% of ALA-accredited library schools offer some type of legal education, but the majority provide one or zero scholarly communication classes (Cross & Edwards, 2011). In addition, 83% of institutional repository (IR) staff and librarians have not received any type of formal, repository-specific training (Simmons & Richardson, 2012). A survey of IRs by Dubinsky (2014) found the majority of repositories continue to utilize a mediated submission system, in which an IR staff member either helps facilitate or undertakes the entire submission process, suggesting populating repositories is likely to remain labor-intensive for IR staff and librarians tasked with IR responsibilities. If further studies confirm the increasing emphasis on scholarly communication in academic library hiring, look for library schools to begin responding to the demands of the job market by instituting more scholarly communication courses in MLS programs. Fortunately, UNESCO has recently released online their *Open Access Curricula for Researchers and Library Schools*. Consisting of two components—a

four-module curriculum for library schools and a five-module curriculum for researchers, the curricula offer education in OA infrastructure, retrieval, scholarly communication, intellectual property and metrics (Unesco, 2015).

Specific elements of scholarly communication

Copyright has emerged as a core component of academic scholarly communication initiatives (Burpee & Fernandez, 2014; Carpenter, 2011; Radom et al., 2012; Staley et al., 2010; Thomas, 2013). A knowledge of copyright is not only useful as a general resource for instructional questions but also essential to the enterprise of educating faculty on authors' rights and self-archiving (Hansen, Cross, & Edwards, 2013; Zabel & Hickey, 2011), particularly given that faculty members "could greatly benefit from more information with respect to the rights they can retain under their author agreements" (Charbonneau & McGlone, 2012, p. 21). Copyright knowledge may, in the future, help to create a new type of librarian that bridges the gap between faculty needs and library services (Carpenter et. al, p. 669).

Institutional repositories (IRs) have become another cornerstone of library scholarly communication initiatives (Burpee & Fernandez, 2014; Carpenter, 2011; Radom et al., 2012; Staley, et al., 2010; Thomas, 2013). IRs provide "a natural entree for conversations about scholarly communication issues" (ARL, 2010, p. 289), and given tight budgets, many academic libraries (regardless of institution size) are attracted to open-source IR systems to cost-effectively engage in scholarly communication initiatives (Hashim & Jan, 2011). However, the growth of IRs has met with some recurrent obstacles. For example, publisher policies on self-archiving, permitted versions for archiving, and license agreements have created "information gaps" amongst IR adopters (Hanlon & Ramirez, 2011, p. 688). In addition, technological concerns (such as keeping IR items consistently and permanently usable even when faced with technological advancements in access technology) are a perennial issue for IR adopters (Duranti, 2010). Finally, faculty contributions can be lacking despite a library's promotion of its IR. As Foster and Gibbons noted in 2005, "the phrase 'if you build it, they will come' does not yet apply to IRs," (Foster and Gibbons). Engagement may vary by discipline, as chemistry and sociology faculty have been found to be more enthusiastic about self-archiving than those in physics and economics (Xia, 2009). General barriers to faculty involvement also exist. For example, Casey (2011) found untenured faculty to be wary of plagiarism issues related to depositing work into an IR, while other faculty have expressed uncertainty regarding copyright agreements with publishers (Davis & Connolly 2007).

Yet another critical component of contemporary scholarly communication is the OA movement. While on the surface academic libraries embracing OA can be seen as motivated by self-interest (tied to shrinking or flat budgets in the face of still-increasing

journal subscription costs), libraries are just as likely motivated by the commonality of OA ideology and the historical mission of libraries; i.e., to democratize information and provide broad public access to resources (Collister & Diliyannides, 2014; Magniafico & Smith, 2012; Ogburn, 2012). A growing number of ARL institutions and libraries are adopting self-archiving policies or resolutions in support of OA (Radom et al., 2012), and over half of non-ARL libraries advise authors on publishing their work in OA journals and offer educational programming (Thomas, 2013). Library directors and deans envision a continued increase in OA engagement and advocacy (Carpenter et al., 2011), and OA should continue to grow into a central role in the mission and activities of academic libraries (Clobridge, 2014; Mullins et. al, 2011). The recent federal mandate for public access to federally funded research, instituted by the Obama Administration in 2013, will futher increase the amount of available OA publications. As Cross (2014) points out, this provides yet another opportunity for academic librarians to advocate and educate about OA.

Finally, many libraries have become publishers themselves; a study by Radom et al. (2012) found that a majority of responding libraries were working to develop new publishing models, while an almost equal number were already publishing journals. It was also found that non-ARL institutions supported publishing, albeit at a lower rate than ARL institutions (Thomas, 2013). There is widespread interest in library publishing, and most libraries with existing publishing programs have reported plans to expand within a year (Mullins et al., 2012). Library publishing programs tend to be small, publishing up to six journals, and 90% are intended to "contribute to a change in the scholarly publishing system, supplemented by a variety of other mission-related motivations" (Mullins et al., 2012, p. 6). The growth of library publishing as a viable paradigm is inevitable and necessary for libraries, which "simply do not have the option to ignore new models of publishing if they wish to continue to pursue their basic, long-standing mission in this new environment" (Mangiafico & Smith, 2014, p. 223). Technology has helped to enable these developments, given that "it is cheaper and easier than ever to acquire the infrastructure necessary to publish an online scholarly journal, and of course we know that the all-important labor (editors and reviewers) has always been free" (Gilman & Ramirez, 2011, para. 5).

Job ads for scholarly communication librarians

Content analysis of job advertisements is an established research design in library and information science literature (recent examples include Cross, 2011; Gold & Gortti, 2013; Xia & Wang, 2014). Such studies are valuable in understanding the evolution of a profession, employers' expectations, and how well a profession interacts with the surrounding ecosystem that demands its services and supplies new members (Choi & Rasmussen, 2009). Incongruities identified, such as job responsibilities listed in advertisements but not commonly offered in standard education and training, can lead to opportunities

for improvement. This is particularly true given the dynamic nature of the information professions, as evidenced by the sudden expansion of librarian job responsibilities in recent decades (Wang, Tang, & Knight, 2010; Detmering & Sproles, 2012).

At least two recent studies have noted the emergence of scholarly communication responsibilities in job advertisements. Cooper and Crum (2013) found that after 2007, job ads for health science librarian positions started to contain the phrase "scholarly communication librarian." They noted that responsibilities included institutional repository work, new publishing models, open access, copyright and authors' rights, and compliance with National Institute of Health (NIH) public access mandates (p. 274). Kim, Warga, and Moen (2013) looked at 173 job advertisements related to digital curation between October 2011 and April 2012 and concluded that the field "currently intersects with a variety of problems and domains from cultural heritage collections to eScience and data science" (p. 67). Detmering and Sproles (2012) determined scholarly communication to be a duty in 7.3% of the listings they studied and noted that "while not pervasive, scholarly communication emerged as another significant trend, particularly in science subject specialist positions. This duty requires collection development and management skills...data sharing projects, open access initiatives, digital repositories" (p. 552). In a 2011 survey of scholarly communication job responsibilities, Cross found that jobs were "overwhelmingly likely" to require strength in legal issues, new forms of scholarship and digital issues (p. 36).

Despite the breadth of these previous studies, all have ultimately surveyed a limited number of libraries and were limited by response rate or focus. By comparison, the current study presents the first comprehensive analysis of scholarly communication job responsibilities across the largest population of library and job types yet examined, taking the broadest, most detailed look yet at scholarly communication and the skill sets desired by academic libraries hoping to fill vacancies.

METHODS

Data

A listing of job advertisements and associated metadata was provided by the American Library Association job list (ALA JobLIST), covering jobs posted between August, 1, 2006 and June 6, 2014. Two documents were included: a list of all jobs with associated metadata (i.e., advertisement start/end data, job title, institution, city, state, years of experience, minimum degree, organization type) and a separate .pdf containing the texts of the job advertisements. All of the job descriptions were matched and merged with their respective announcements using a PHP script and duplicates were removed. The final list contained 13,869 job advertisements, the majority of which were postings from academic/research institutions.

Sampling

We drew a purposive sample from the list of all jobs, selecting only those advertisements that contained the phrase "scholarly communication*" in the text or title. This generated a list of 598 total job advertisements. Nearly all of these were classed as "academic/research" organizations (Table 1). However, classification errors became apparent upon closer examination: all 11 advertisements mentioning scholarly communication and classed under School Library/Media Center (K-12) were incorrectly classified and were in fact for positions at academic research institutions. This finding supported our decision to include all organization types in the subsequent analyses.

Organization type	Total #	% of total	# of SC jobs	% of SC jobs
Academic/Research (College/University)	8,216	59.2%	571	95.5%
Public Library	3,345	24.1%	1	0.2%
Government (Federal/State) Library	512	3.7%	4	0.7%
School Library/Media Center (K-12)	432	3.1%	11	1.8%
Library Cooperative/System	375	2.7%	2	0.3%
Other	313	2.3%	2	0.3%
Association	158	1.1%	0	0.0%
Special Library/Corporate	144	1.0%	1	0.2%
Vendor	126	0.9%	0	0.0%
Library and Information Science School	104	0.7%	6	1.0%
Publishing	96	0.7%	0	0.0%
Museum	48	0.3%	0	0.0%
TOTAL	13,869	100.0%	598	100.0%

Table 1. Number of jobs and percentage of jobs coded as scholarly communication by organization type

Coding and analysis

The 598 job advertisements were manually examined, and a list of categories was inductively developed. These included six categories:

> **1. Core:** Jobs for which scholarly communication activities are central to the position (including management positions where scholarly communication is dominant). For example: "The Scholarly Communications Librarian will manage the Princeton

University Library's efforts to support scholarly publication innovations and reforms; and will supervise and coordinate activities related to the Princeton Open Access policy and the Princeton Institutional Repository."

2. Inclusion: Jobs indicating the position would include scholarly communication activities, although scholarly communication was not the dominant activity. For example, an art librarian position where the applicant would need to "increase awareness in the arts disciplines of issues pertaining to scholarly communication; copyright; and authors' rights; in collaboration with the Head of Copyright Resources."

3. Management: Jobs supervising, overseeing, or managing activities including scholarly communication but for which scholarly communication was not dominant. For example: "The position will manage a multi-million dollar materials budget; provide leadership for the selection; licensing; management and preservation of print and electronic resources; and manage the libraries' participation in consortial and cooperative activities that include collections and scholarly communication."

4. Active awareness: Jobs requesting the applicant stay abreast of scholarly communication issues. For example, "The successful candidate will maintain a strong awareness of issues related to scholarly communications including copyright; open access; repositories; and licensing of online resources."

5. Knowledge: Jobs requesting familiarity/experience with or knowledge of scholarly communication. For example, "Knowledge of current practice in scholarly communication in the sciences."

6. None of the above: The job does not indicate that the employee will conduct or supervise scholarly communication activities, nor does the position ask for knowledge or need to maintain awareness of scholarly communication trends.

Exclusivity was enabled by sequential coding: that is, the coding stopped if an item was in the first category, even though it is likely that such jobs also included familiarity with scholarly communication and a need to stay abreast of new trends in the areas. Similarly, if the job included supervision of scholarly communication units and familiarity with scholarly communication, only "3" was coded. The categories were ordered to indicate the level of engagement with scholarly communication initiatives, from high to low. There are notable limitations to this approach, foremost being the conceptualization of scholarly communication. In the most liberal interpretation, one could claim that scholarly communication is the mission of all academic libraries and therefore all academic library

positions include some element of scholarly communication. However, we took a conservative approach and coded advertised positions only as related to scholarly communication when they were explicitly labeled as such. This meant that some positions such as "Copyright and Licensing Librarian," "Digital Repository Services Librarian," and even some jobs with scholarly communication in the title were coded as "2" rather than "1" when they contained central tasks that are ultimately ancillary to scholarly communication. Given this strict coding, many of the subsequent analyses merged these two categories as positions including substantial scholarly communication elements.

Job advertisements were examined and coded by two of the authors based on both the title and the text of a job advertisement. In the case of any ambiguity, the case was discussed until agreement between the two authors was reached. In the case of continued ambiguity, the case was presented to the third author for arbitration. No links were followed and the text was interpreted literally (e.g., if the job title asked the applicant to "apply knowledge of scholarly communication," this was different than asking one to "be knowledgeable about scholarly communication").

Job advertisements for which scholarly communication activities were present or dominant were selected for additional title analysis. Inductive coding was used to generate categories and then all jobs were examined to see whether they contained the following words/phrases: "scholarly communication*," digital, collection, copyright, research, repositor*, scholar* (without communication), publish*, or data. In addition, job titles were examined in order to determine whether the position was for an administrative position or a subject librarian. Codes were not exclusive—a single job advertisement could be coded into multiple categories.

All of the jobs containing "scholarly communication*" in the text or title were also manually examined for the presence of scholarly communication keywords. This list was generated inductively: keywords were extracted from manually examined ads. After examining all 598 selected job advertisements, a list of words/phrases was generated. From this list, similar words/phrases were merged (for example, "intellectual property" with "intellectual rights" and "open access" with "open-access"). These words/phrases were then analyzed for their presence in the 598 scholarly communication jobs as well as the proportion of non-scholarly communication job advertisements in which they appeared.

Limitations

The traditional difficulties of working with job advertisements are present here. Some job advertisements are for multiple positions. In these cases, the job most similar to scholarly

communication was coded. Other advertisements were a republished version of the same job, sometimes with slightly different language. There were 65 job advertisements (less than 1% of all job advertisements) among the set that had exactly the same text and title, but different metadata (e.g., different ad start and end dates). We treated these as unique units, since it could be possible that the university used a standard template for all jobs and the jobs were, in fact, two unique jobs. Finally, job advertisements differ in length and language style. We used only the text and title of the job advertisement as the unit of analysis and did not investigate additional information for the job. Furthermore, we took the job advertisement literally, although there are likely jobs that include scholarly communication activities but do not make it explicit. Therefore, it is likely that our coding erred towards false negatives: it's likely that there are more jobs advertisements for scholarly communication that are not in our sample than those that are not about scholarly communication, but were coded as such.

RESULTS

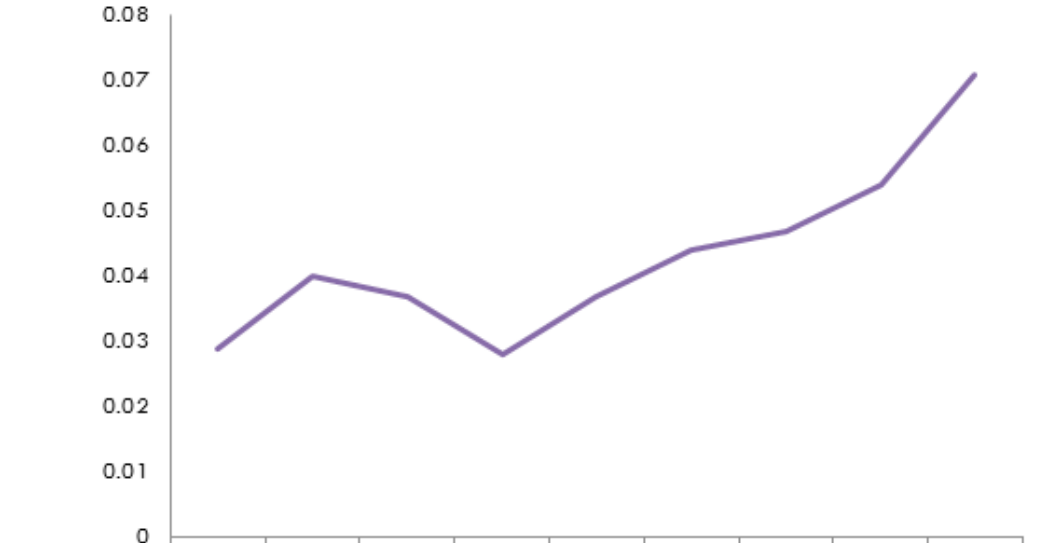
Prevalence

The percentage of jobs over time including the term "scholarly communication*" in the text or title is shown in Figure 1 (following page; only partial data were available for 2006 and 2014, hence the lower number of total job advertisements). Jobs mentioning scholarly communication have increased each year since 2009, with the greatest increase in 2014. This suggests a growing interest in this area, with more than 7% of all job advertisements in 2014 including a reference to the phrase "scholarly communication*." This percentage increases when examining only those jobs classified as academic/research by ALA JobLIST: more than 11% (n=63) of these 553 jobs contained a reference to scholarly communication.

Levels of engagement

Nearly 40% (n=232) of the job advertisements with "scholarly communication*" in the text or title listed activities or skills directly related to scholarly communication librarianship (i.e., were coded as either Core (1) or Inclusion (2)). Of these jobs with "scholarly communication*" in the title or text, 13% (n=80) were for Core (1) scholarly communication positions. Core positions were most likely to reference scholarly communication in the title of the position (i.e., 71.3% of core positions), though more than a quarter did not. Jobs where scholarly communication activities were present, but not dominant (i.e., Inclusion (2)) comprised a quarter of all positions (n=152) with "scholarly communication*" in the text or title. (See Figure 2).

More than a third (n=211; 35.2%) of the positions with "scholarly communication*" in the text or title asked for familiarity or experience with, or knowledge of, scholarly



	2006	2007	2008	2009	2010	2011	2012	2013	2014
Jobs	797	2423	2097	1054	1349	1553	1735	1972	888
SC jobs	23	97	77	30	50	69	82	107	63
% of total	2.9%	4.0%	3.7%	2.8%	3.7%	4.4%	4.7%	5.4%	7.1%

Figure 1. Total advertised jobs that were classified as scholarly communication positions, by year and percentage (The total shown here is one less than the total because one job advertisement was missing a year)

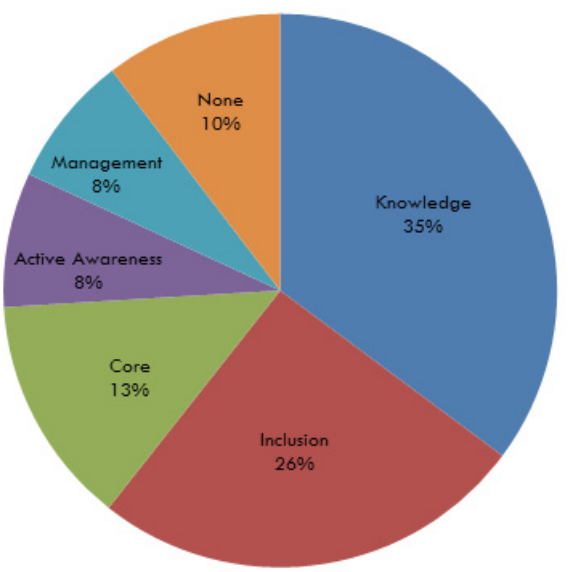


Figure 2. Proportion of all jobs with "scholarly communication*" in the text or title by code

communication and related issues (i.e., Knowledge (5)). Another 7.9% (n=47) asked that the candidate maintain awareness of issues related to scholarly communication once they are in the position (Active Awareness (4)). Slightly fewer, 7.7% (n=46), did not directly engage in scholarly communication activities, but were in positions to manage, supervise, or otherwise oversee these initiatives. Common positions were directors of units (e.g., collection development), under which the scholarly communication unit was a single part.

More than 10% of the jobs with "scholarly communication*" in the text or title (n=62) did not ask for applicants to conduct activities, oversee activities, or have knowledge of issues related to scholarly communication. These were primarily job advertisements in which applicant would report to someone with a title including the term scholarly communication or described institutional commitment to scholarly communication.

Figure 3 shows the presence of these categories from 2006-2014. Data for 2006 and 2014 is incomplete, as we only received the job advertisements covering part of each of those years. As shown, the proportion of jobs that include scholarly communication activities as core or substantial portions of the position (1&2) is rising, while those only requiring knowledge of scholarly communication is declining (5).

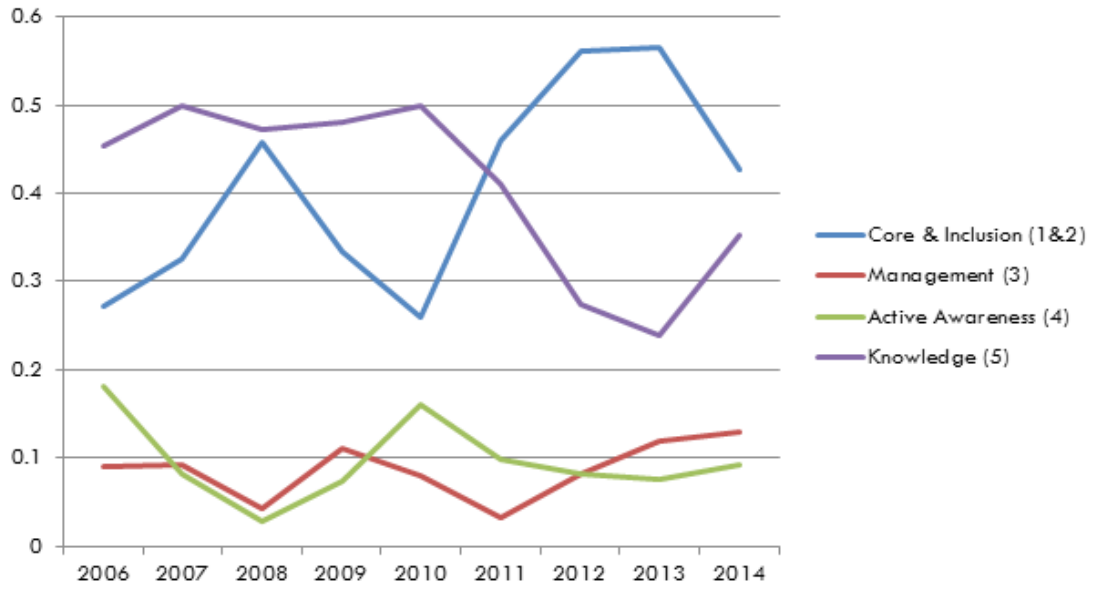


Figure 3. Proportion of jobs with scholarly communication in the text or title by type of position over time

Title analysis

To examine what types of positions contained scholarly communication activities, we further investigated job titles for the 232 jobs that were either explicitly focused on scholarly communication or required some scholarly communication activities (Core (1) and Inclusion (2)). As shown in Figure 4, the plurality of jobs indicated an administrative appointment. These were fairly evenly distributed between core scholarly communication positions and jobs for which scholarly communication was only one part. Subject librarians constituted a large proportion of the 232 job advertisements, but were heavily concentrated in the second coding category; that is, these jobs included components of scholarly communication, but were not primarily focused on such. On the other end of the spectrum, jobs with scholarly communication in the title were almost exclusively classified as being Core scholarly communication jobs and represented more than one-quarter of these positions.

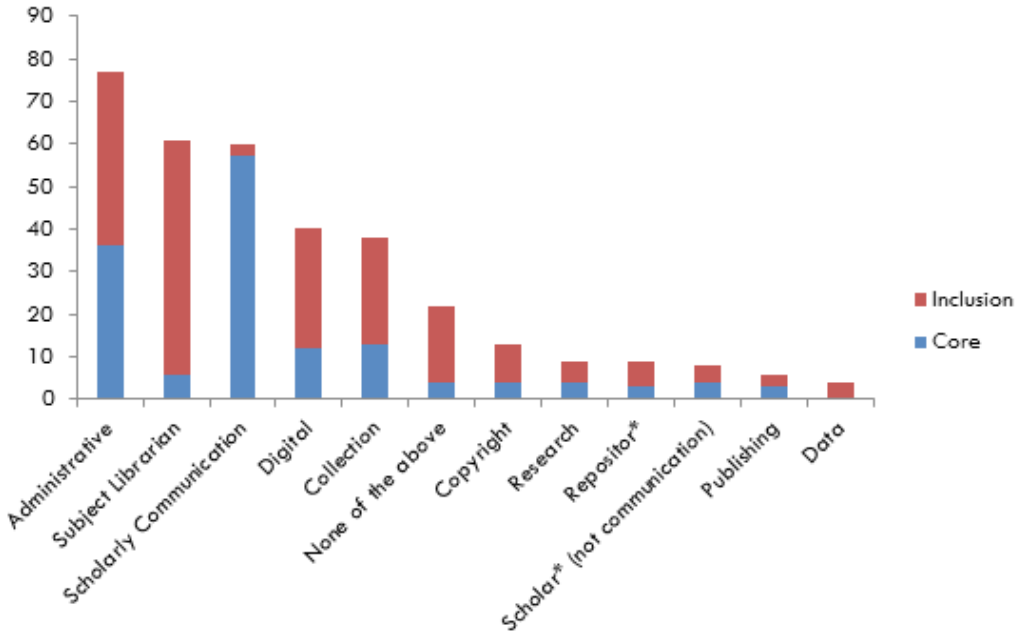


Figure 4. Analysis of job titles for Core and Inclusion positions

"Digital" was a fairly common term in the job titles, with positions such as "Digital Initiatives Librarian," "Digital Collections Specialist," "Digital Repository Librarian," and variations of these featuring prominently. These jobs were often coded as Inclusion positions, as scholarly communication was not their central focus. The presence of scholarly

communication activities in collection management was also apparent. Many of these were for administrative positions where collection and scholarly communication were joined; for example, "Assistant Dean for Scholarly Communications and Collection Development" and "Associate University Librarian for Collections and Scholarly Communication."

Terms such as copyright, research, repositor*, scholar* (without communication), and publishing were also present in the titles, but to a lesser degree.

Key concepts

Seventy words and phrases related to scholarly communication were inductively derived and coded in list of the 598 job advertisements. Those words appearing in more than 10% of scholarly communication job advertisements are listed in Table 2. The term "scholarly

Word/Phrase	Frequency	% of sampled ads (n=598)	% of Core/Inclusion ads (n=232)
instruction	339	56.7%	53.9%
digital	328	54.8%	63.8%
liaison	233	39.0%	42.7%
publisher*/publishing	191	31.9%	37.5%
outreach	175	29.3%	34.9%
repositor*	152	25.4%	42.7%
scholarship	138	23.1%	30.6%
copyright	117	19.6%	31.5%
consortia	113	18.9%	14.7%
policy	112	18.7%	15.9%
electronic resource	111	18.6%	19.0%
preservation	108	18.1%	19.8%
standards	98	16.4%	17.2%
institutional repositor*	94	15.7%	28.9%
open access/open-access	93	15.6%	30.2%
metadata	91	15.2%	20.3%
awareness	90	15.1%	20.3%
digital library	87	14.5%	16.8%
licens*	80	13.4%	15.5%
scholarly publ*	67	11.2%	17.2%
data management	63	10.5%	11.6%

Table 2. Number of times coded words appear in jobs with "scholarly communication*" in the text or title and the proportional frequency in sampled job advertisements and proportion of those coded as Core or Inclusion positions

communication" is omitted from this table and subsequent tables, as it was used to generate the set of job advertisements and appeared in all but one of the job ad texts.

Many of these words could also be listed in other job advertisements; for example, one could imagine "instruction" appearing in numerous contexts. Therefore, we analyzed the words/phrases across all the available non-scholarly communication job advertisement texts (n=13,271). All of the 70 words/phrases were proportionally more prevalent in scholarly communication job advertisements than in non-scholarly communication job advertisements: for example, whereas "instruction" was found in 56.7% of scholarly communication job advertisements, it was only found in 32.9% of non-scholarly communication job advertisements. Table 3 lists those words/phrases with a difference of more than 10 percentage points between the use in scholarly communication job advertisements and non-scholarly communication job advertisements.

Words/Phrases	% scholarly comm (n=598)	% non-scholarly comm (n=13,271)	Difference
digital	54.9%	18.4%	36.5%
publisher*/publishing	31.9%	4.4%	27.5%
liaison	40%	14.7%	24.2%
instruction	56.7%	32.9%	23.8%
repositor*	25.4%	3.7%	21.8%
copyright	19.6%	1.9%	17.7%
scholarship	23.1%	5.7%	17.4%
outreach	29.3%	13.6%	15.7%
open access/open-access	15.6%	0.4%	15.1%
institutional repositor*	15.7%	1.3%	14.5%
consorti*	18.9%	5.6%	13.3%
preservation	18.1%	5.6%	12.5%
policy	18.7%	7.1%	11.6%
awareness	15.1%	3.6%	11.6%
digital library	14.1%	3.9%	10.7%
scholarly publ*	11.2%	0.7%	10.5%

Table 3. Proportional frequency of terms in sampled and non-sampled advertisements

These lists provide distinguishing terms for scholarly communication positions. However, many differences can be seen between those coded as Core and Inclusion versus those coded as Management, Awareness, or Knowledge. Table 4 (following page) provides those proportionally more likely to appear in Core or Inclusion.

Word/Phrase	% of 1 & 2 (n=232)	% of 3-5 (n=304)	Difference
repositor*	42.7	14.8%	27.9%
open access/open-access	30.2%	7.6%	22.6%
institutional repositor*	28.9%	8.2%	20.7%
copyright	31.5%	14.1%	17.3%
digital	63.8%	46.7%	17.1%
authors' right*/author right*/authors' right*	16.8%	0.00%	16.8%
scholarship	30.6%	18.4%	12.2%
intellectual property/intellectual rights	15.5%	4.6%	10.9%
metadata	20.23%	9.5%	10.7%
publisher/publishing	37.5%	31.3%	6.3%

Table 4. Terms proportionally more likely to appear in Core or Inclusion positions

Table 5 lists those terms and phrases proportionally more likely to appear in Active Awareness, Knowledge, or Management positions.

Word/Phrase	% of 1-2 (n=232)	% of 3-5 (n=304)	Difference
Consorti*	14.7%	22%	-7.4%
instruction	53.9%	60.2%	-6.3%
Policy	16%	21.4%	-5.4%
academic research	4.3%	7.9%	-3.6%
emerging info*	0.9%	4%	-3.1%
serials acquisition	0.00%	1.3%	-1.3%
Licensing	9.1%	9.9%	-0.8%
geospatial	1.3%	2%	-0.7%

Table 5. Terms proportionally more likely to appear in Active Awareness, Knowledge, or Management positions

For ads coded 1-5, several trends were evident in regard to the use of certain key terms in the scholarly communication job ads over time. Some fluctuated markedly (e.g., "scholarship" and "publishing"), while others exhibited a relatively steady increase or decrease over time. For example, "electronic resource" was one of those that seemed to fall out of favor as time went by, decreasing from 26.7 % in 2007 to 13% in 2013. By contrast, "data management" grew significantly more popular with time, from 5.8 % in 2007 to 15.2 % in 2013. The terms "data management," "data curation," "authors' rights" (and variants),

and "compliance/federal mandate/NIH public" terms were rarely used during the first half of the time frame, only coming into something approximating prominence since 2011. Conversely, "legislation/legislative," although never amongst the most popular terms, disappeared almost completely after 2009.

"Scholarship," "instruction," and "outreach" all experienced large increases in use. "Scholarship" increased from 15.1% in 2007 to 28.3% in 2013. Instruction, present in 46.5% of ads in 2007 saw its use increase to 67.4% in 2013, indicating increasing engagement of scholarly communication programs and instruction librarians. "Outreach" nearly doubled, from 18.6% to 36.9% while "awareness" and "metadata" experienced an overall decrease in use over the same period of time. Interestingly, "social media" peaked with its first introduction into the scholarly communication job ads in 2011 with six percent; in the three years since its use has declined to just 1.8 percent.

DISCUSSION

Prevalence

Our first research question sought to identify the prevalence of scholarly communication in job advertisements. Our analysis found that 4.3% of the 13,869 job advertisements over the last nine years contained at least one reference to the phrase "scholarly communication*." The proportion of jobs mentioning scholarly communication has increased steadily since 2009, with the greatest increase between 2013 and 2014. The drop in 2009 is likely explained by the recession: there were half as many jobs posted in 2009 as in 2008, and it is likely that the jobs that were available this year were focused on replacing current positions rather than creating new ones. It is important to note that the percentage dip from 2008-2009 recovered immediately and the percentage has increased ever since. It is not unreasonable to postulate that the current figure (7.1%) would be even higher if not for that anomaly. Both the current figure and the percentage of jobs coded as scholarly communication positions in 2010 (3.7%) are lower than the 7.3% identified by Detmering and Sproles (2012), which looked at entry level library job advertisements posted in 2010. We could expect that, given our trend data, the current number will continue to grow, particularly in the context of academic libraries (for which 11% of 2014 jobs contained a reference to scholarly communication).

Engagement

The extent of scholarly communication activities in job advertisements was the focus of the second research question. We investigated this through a classification of jobs containing

the phrase scholarly communication into varying levels of engagement. The plurality of jobs stated explicitly that the applicant would be required to conduct scholarly communication activities. The requirements for this assume that the applicant is able to implement various scholarly communication initiatives. This, in turn, assumes a working knowledge of trends and issues in scholarly communication as well as some technical knowledge.

More than a third of the advertisements requested that the applicant have knowledge of scholarly communication issues. This suggests a need for focused educational efforts in MLS programs to ensure that graduates have a working familiarity with issues relating to scholarly communication, particularly if they are interested in academic librarianship. Another large fraction of the sampled ads required that the employee stay abreast of scholarly communication issues or supervise units conducting activities directly related to scholarly communication. Given the rising number of positions in this category, it seems there is a need for more continuing education on this subject.

Ten percent of job advertisements did not ask for any engagement in scholarly communication, but mentioned the term in relation to a reporting line (i.e., the individual would report to a Director of Collections and Scholarly Communication) or in describing the strengths of the library. Given the growing use of the term in administrative titles, it may become more necessary for all prospective academic librarians to have a working knowledge of scholarly communication issues in order to communicate effectively among and within library units.

Titles

Our third research question investigated the types of jobs associated with scholarly communication activities, as evident in job titles. We found that the largest percentage of jobs--and nearly half of those coded as being core scholarly communication positions--was classed as administrative jobs. Unless libraries are hiring new librarians and placing them into administrative roles instead of entry-level positions, this would indicate that the bulk of scholarly communication responsibility within academic librarianship is being handled by more senior faculty and staff. This finding recalls the study by Connell and Cetwinski (2010), who found that 86% of the technical services positions involved with IRs are not new, as well as the recent expansion of librarian job responsibilities reported by other authors (Detmering & Sproles, 2012; Wang, Tang, & Knight, 2010).

Subject librarians were another large population involved with scholarly communication. A fairly common refrain in these job ads was that the librarian should seek to "increase awareness" among their stakeholders regarding scholarly communication issues. Some specifically called for advocacy (e.g., "advocate for sustainable models of scholarly

communication," "promote relevant scholarly communication issues," "contribute to advocacy efforts," and "provide education and advocacy around new models of scholarly communication"). Most did not describe what these "scholarly communication issues" were, although one list provided copyright, authors' rights, open access, and digital repositories as examples of relevant topics. This finding—that subject librarians are being tasked with scholarly communication advocacy—seems to support the existence of the environment identified by Kirchner (2009), who found that scholarly communication duties were being assigned to existing units, rather than to newly created ones.

"Digital" was a common word used in the job titles: for example, Digital Initiatives Libraries, Head of Digital Scholarship, and Digital Access Libraries. However, nearly all of them should perhaps be more appropriately called "Digital Repository Coordinator," as management of the institutional repository was dominant across the identified job advertisements, as was the implementation or management of other library publishing initiatives (though publishing only appeared in 6 titles). There were a few job ads that were more focused on Digital Humanities or Digital Libraries, but these were almost exclusively institutional repository jobs under a refurbished label. Note that only 9 jobs had the term repositor* anywhere in the title, and of these, five also contained the term digital. This suggests that librarians have responded to the argument that digital libraries should play a greater role in scholarly communication, perhaps due in part to their potential for interacting with and facilitating the "social life" of documents (Borgman, 2000, p. 414).

Work with institutional repositories was also present in jobs with "collection" in the title, though many collection jobs were more administrative in nature. This may show a trend towards incorporating the term "scholarly communication" into positions that were traditionally focused on collection management (e.g., "Assistant Dean for Collection Management and Scholarly Communication") or including scholarly communication duties in positions that did not previously include them (e.g., "Collection Development Librarian"). The data suggests that collection management and scholarly communication are becoming more closely linked in library scholarly communication programs. As libraries continue to launch such programs, and as the trend of adding scholarly communication responsibilities to existing job responsibilities is likely to continue barring increases in library budgets to accommodate new hires, it is perhaps inevitable that certain areas will develop to become more closely tied than others. Researchers should continue to look at collection development librarians to determine if scholarly communication initiative integration will be a continued trend.

Nearly 10% of the jobs did not contain any of these key words: some of these were generic titles (e.g., Librarian/Assistant Professor), but many other were explicitly titled

(e.g., Metadata Librarian, Outreach Librarian, Electronic Resources/Serials Librarian). This suggests that many different positions in the library are likely to include scholarly communication components. However, this may also demonstrate a problem in lack of clear definitions and boundaries for scholarly communication librarians. Given this, we concur with Simmons and Richardson's (2012) call for appropriate and formalized job descriptions. While their study specifically looked at institutional repositories, their five suggestions for improvement are applicable to all of scholarly communication librarianship: appropriate job descriptions, new educational opportunities, guidance for internal training, development of academic curriculum, and coordination of existing training opportunities (Simmons & Richardson, 2012).

Concepts

Our final research question sought to explore the concepts that define scholarly communication positions. The most frequently used terms provide an indication of those concepts that define the practice of scholarly communication: instruction; digital products; outreach and liaison work; publishing; repositories; copyright, policy, and licensing; preservation; metadata, standards, and data management; and open access were all dominant in these job ads. While several studies have looked at scholarly communication responsibilities of different types of librarians, such as liaisons (Kirchner, 2009; Wright, 2013) and technical services (Connell & Cetwinski, 2010), we sought to identify what differentiates scholarly communication librarians from other professional positions in the field. To separate these trends from trends in librarianship overall (e.g., an increased emphasis on instruction), we looked at those terms that appeared proportionally more often in our sampled list of scholarly communication positions than in the entire list of job advertisements. The ranked list of terms provides a clear indication of the items that differentiate scholarly communication positions. In such a list, digital, publishing, and liaison work appear as the most differentiating.

However, it should be noted that a large proportion of the jobs were for subject librarians and those who are tasked with more passive activities related to scholarly communication (e.g., Awareness and Knowledge). Terms like "liaison" might be expected, even though it is not truly indicative of the key tasks with which scholarly communication librarians are concerned. Therefore, a subsequent analysis sought to identify those most likely to occur in Core or Inclusion positions. This analysis revealed that Core and Inclusion positions are most likely to be concerned with repositories, open access, copyright, intellectual property, and scholarly publishing tasks. Conversely, positions for which scholarly communication is only a peripheral task are more focused on consortia agreements, instruction, policy, and serials acquisition and licensing.

Finally, there has been an increased emphasis on instruction, outreach, data curation, authors' rights, and federal compliance in the last few years. The emphasis on electronic resources, legislation, and metadata has also decreased.

CONCLUSION AND FUTURE RESEARCH

The era of intense engagement by academic libraries with scholarly communication issues is well upon us, occurring at all levels of academic librarianship. In many ways, this research makes manifest what has been largely anecdotal and confirms what has been suggested by recent studies. For example, Thomas (2013) found a "consistent pattern of non-ARL schools providing the same kinds of SC services, just at lower rates of adoption— suggesting an opportunity for programmatic growth" (p. 169). Similarly, library directors predict that libraries will continue to reinvent their roles to incorporate scholarly communication as they increasingly assume a role in publishing and face the need to remain relevant (Carpenter et al., 2011). This prediction is shared by the Association of Research Libraries, which predicts greater engagement by libraries in scholarly communication, including partnerships with commercial publishers (ARL, 2014). We may predict, given our data, that scholarly communication will soon be considered a core component of academic librarianship, alongside the traditional pillars of the trade (references and instruction, collection development, cataloging).

Given the newness of scholarly communication projects and services in academic librarianship, a discrepancy between the reality of job responsibilities and educational focus in library schools is to be expected. However, this is an issue that must be addressed. To continue to neglect scholarly communication at the library school level will only do a disservice to those students currently training to becoming librarians and those libraries seeking to fill vacancies with individuals familiar with those specific skillsets. Over the next decade, we can reasonably expect that scholarly communication programs will continue to proliferate as libraries devote resources toward launching and maintaining scholarly communication initiatives.

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