



Scholarly communication competencies: An analysis of confidence among Australasian library staff

Kingsley, Danny; Kennan, Mary Anne; Richardson, Joanna

<https://research.usc.edu.au/esploro/outputs/journalArticle/Scholarly-communication-competencies-An-analysis-of/99642278002621/filesAndLinks?index=0>

Kingsley, D., Kennan, M. A., & Richardson, J. (2022). Scholarly communication competencies: An analysis of confidence among Australasian library staff. *College & Research Libraries*, 83(6), 966–993.

<https://doi.org/10.5860/crl.83.6.966>

Document Type: Published Version

Link to Published Version: <https://doi.org/10.5860/crl.83.6.966>

UniSC Research Bank: <https://research.usc.edu.au>

research-repository@usc.edu.au

CC BY-NC V4.0

Copyright Danny Kingsley, Mary Anne Kennan, Joanna Richardson. This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

Downloaded On 2024/05/02 21:38:14 +1000

Scholarly Communication Competencies: An Analysis of Confidence among Australasia Library Staff

Danny Kingsley, Mary Anne Kennan, and Joanna Richardson

Through a nationwide survey of universities and research organizations in Australia and New Zealand, this article investigates the level of confidence that librarians working in scholarly communication have in their current competencies. The results show that, while respondents were generally confident across seven competency areas (institutional repository management, publishing services, research practice, copyright services, open access policies and scholarly communication landscape, data management services, and assessment and impact metrics), the majority combined their scholarly communication tasks with other roles. Challenges across the sector in updating skills and knowledge to keep abreast of current trends and developments were identified, with implications for improving professional development opportunities.

Introduction

The purpose of the academic library in the contemporary digital world continues to be characterized as supporting learning, teaching, and research activities.¹ The complexity of the world in which so many researchers operate is constantly changing, affecting the services libraries need to provide. Whether it is the redevelopment of relevant tools for tackling new avenues of research or innovative digital tools that facilitate communication, collaboration, and data analysis, researchers find themselves having to keep pace with a rapidly changing research lifecycle.² As a result, librarians, along with other institutional stakeholders who support research, are also having to adapt and change so they can tailor their services to better meet the needs of researchers across the organization.

Librarians in universities find themselves routinely working with academics in scholarly communication, in many cases providing training and support to both research students and academics on aspects of scholarly communication as diverse as research data management;

**Danny Kingsley is a Visiting Fellow at the Australian National Centre for the Public Awareness of Science ORCID <https://orcid.org/0000-0002-3636-5939>; email: danny@dannykingsley.com. Mary Anne Kennan is an Adjunct Associate Professor at Charles Sturt University ORCID <https://orcid.org/0000-0003-1342-9853>; email: maryanne.kennan@gmail.com. Joanna Richardson is a Scholarly Communication Consultant at Griffith University ORCID <https://orcid.org/0000-0002-1871-6707>; email: jprglobal46@gmail.com. ©2022 Danny Abigail Kingsley, Mary Anne Kennan, and Joanna Richardson, Attribution-NonCommercial (<https://creativecommons.org/licenses/by-nc/4.0/>) CC BY-NC.*

scholarly publishing; open access, institutional repositories, and other publishing platforms; copyright; and research impact metrics. While there is constant change, much of the work that libraries do in scholarly communication support is directly related to services librarians already offer. For example, research data management includes elements of metadata work, selection and deselection of data for deposit, and providing a catalogue of the institutions' research data:³ that is, what Andrew Cox has referred to as new work that is similar to existing library work.⁴

Although some librarians, particularly in North America, hold faculty status, many do not, including those in Australia and New Zealand (Australasia). Thus librarians, in addition to needing to keep up with a constantly evolving scholarly communication environment, sometimes have to work with people who do not understand or recognize their expertise in this area. This reality places librarians in the position of having to learn constantly evolving complex scholarly communication skills and provide services to, and sometimes train, highly skilled researchers who may view librarians as less credentialed or capable.⁵

The purpose of this study is to increase understanding of the scholarly communication support work currently undertaken in Australasian universities and other research institutions, particularly in their libraries. For the purposes of this study, we define scholarly communication roles as roles that include: institutional repository management, publishing services, research practice, copyright services, open access policies and the scholarly communication landscape, data management services, and assessment and impact metrics. We focus on the support respondents experience in their roles, the confidence staff have in the knowledge and skills required to work in scholarly communication, the formal qualifications respondents have, and the training and professional development they have undertaken. This understanding will enable the following:

- Identification of areas where confidence is low in scholarly communication competencies;
- Identification of gaps in education and training; and
- Increased understanding of scholarly communication knowledge and skills requirements to inform future education and training provided by employers, trainers, and educators.

Literature Review

Technological advances and changes in social and cultural mores have led to changes in the way research is practiced. Research has become more distributed and collaborative and technological tools are constantly being developed to assist in all phases of the research lifecycle.⁶ As the nature of research is evolving, so too is the complexity of the data-intensive world in which many researchers operate. In this context of constant change, tools for tackling new avenues of research or innovative digital tools that facilitate communication, collaboration, and data analysis, researchers find themselves having to keep pace with a rapidly changing research lifecycle. The European Commission Report on the Consultation Workshop Skills and Human Resources for E-Infrastructures within Horizon 2020,⁷ for example, has recognized the need for researchers to access not only suitable e-infrastructures but also expertise, given the rapid developments within the research environment. In 2016, Bianca Kramer and Jeroen Bosman⁸ undertook an extensive survey of the use of tools by researchers. Of the 20,663 responses, the researchers found that the average number of tools reported per person was 22. Another key finding from their work was that researchers not only used many tools, but they also used them in combination. Wolski, Howard, and Richardson have also highlighted the "sheer number and complexity" of tools used by researchers.⁹

As the nature of research changes, so do the ways in which it is disseminated, hence the importance of scholarly communication. The ACRL 2019 report, *Open and Equitable Scholarly Communications: Creating a More Inclusive Future*,¹⁰ states: “scholarly communications begins with the process of creating the work itself (research, writing, collaboration); continues through production, distribution, and evaluation of that work; and includes its sustainability.” Scholarly communication underpins the connectedness among scholars and disciplines.¹¹

Library support for research, including scholarly communication, has been well documented in the literature. For example, a 2012 analysis of job announcements identified “Scholarly Communications Librarian” as a new role for health sciences.¹² These library roles in scholarly communication are evolving; so too are how librarians support researchers. Jeremy Atkinson, for example, has reported on ways in which academic libraries support research in the context of the research lifecycle.¹³ Corral, Kennan, and Afzal examined bibliometric and research data services.¹⁴ Subsequently, the literature has tended to examine support specifically for the research data lifecycle, with a focus on research data management and data literacy,¹⁵ and some of the ways such support can be seen to be transforming academic libraries.¹⁶ A recent paper looking at traditional and emerging roles for librarians in Canada found that most librarians were confident in their positions but with most confidence in traditional areas such as supporting teaching and learning and less confidence in emerging areas such as research support and scholarly communication.¹⁷

Research support and scholarly communication are intertwined. To support research, librarians need to have a good understanding of all the components of scholarly communication. Research has reported on the opportunities for libraries to support scholarly communication—not only generally¹⁸ but also in a targeted manner.¹⁹ In member institutions of the Association of Research Libraries (ARL), Sandy, Millian, and Hudson-Vitale have reported a 49 percent rise in the number of scholarly communication librarians between 2012 and 2017, with aspects of the role reported as currently core, emerging, or auxiliary.²⁰ They conclude that more needs to be done to communicate the value of these skills and competencies to researchers and librarians moving forward.

Supporting scholarly communication has been accompanied by a significant shift in the skills required of librarians. In 2012, a major report from Research Libraries UK identified skills gaps in nine key areas.²¹ A more recent work that focused on transitioning library services to support scholarly communication noted, “To successfully address the current needs of a forward-thinking faculty, the academic library needs to place scholarly communication competencies in the toolkit of every librarian who has a role interacting with subject faculty.”²² Another description of these changing requirements is that of “the librarian with more”: that is, one who combines traditional library skills with added knowledge of working with and manipulating data.²³

There have been numerous attempts to define the competencies required of library staff working within the area of scholarly communication, including bibliometric work,²⁴ research data management,²⁵ and scholarly publishing and repository services.²⁶ More broadly, this area has been addressed through the development of lists of scholarly communication competencies by major library and information science (LIS) organizations: for example, the Association of College and Research Libraries (ACRL),²⁷ Confederation of Open Access Repositories,²⁸ and NASIG (formerly the North American Serials Interest Group, Inc.).²⁹ Australian Library and Information Association (ALIA), in their foundation knowledge and skills recommendations, has only explicitly mentioned scholarly communication since December 2020.³⁰

To support research and scholarly communication, librarians need to be equipped with scholarly communication competencies.³¹ While it would be useful if an introduction to these were provided as a part of the formal education and training of librarians, a 2017 UK study of the background of people working in scholarly communication showed that most of these skills were obtained on the job.³² A 2019 literature review by Jaya Raju stated there was “compelling evidence to suggest that LIS schools globally are falling short of meeting academic library knowledge and skills requirements in the fast-evolving area of scholarly communication.”³³

In her survey of impostor phenomenon and skills confidence among scholarly communication librarians in the United States, Erin Owens³⁴ found that confidence in skills varied across a range of competencies as defined by NASIG.³⁵ She has suggested that, based on the high negative impact of respondents having too many responsibilities, combined with lack of applied practice, the Library and Information Science (LIS) profession needs to pay more attention to developing opportunities for hands-on applied training.

There have been some initiatives to address this challenge. For example, Craft and Harlow³⁶ have documented a scholarly communication training program implemented at University of North Carolina Greensboro (UNCG) Libraries that not only delivers information to the research community, including graduate students, but also improves the understanding of scholarly communication among library staff. UNCG has adopted a modular approach, which covers four main topics: open access, research identity management, scholarship metrics, and scholarly communication basics. Other libraries and library affiliate organizations have also developed informal training modules to assist practicing librarians in updating their scholarly communication skills, such as the Australian 23 Research Data Things³⁷ and the University of Melbourne’s 23 Research Things.³⁸

Given the perceived current lack of required technical skills in librarians operating in a data-intensive research environment, it has been proposed to employ people in scholarly communication roles who bring other qualifications, experience, and skills to the library setting.³⁹ This was also mentioned in a paper looking at research into trends in liaison librarianship, where a team approach with different backgrounds and skills was advocated.⁴⁰ Sewell reports the trend of employing people with PhDs in scholarly communication roles has been proposed by some as a solution,⁴¹ although not necessarily as the best one.⁴² However, Bell and Kennan, in discussing the involvement of librarians in the digital humanities, propose that this foci on bringing experts with additional knowledge into the library, rather than focusing on upskilling librarians in emerging knowledge and skill requirements, relies on an outdated “service” model of librarianship.⁴³ They propose that education and training for librarians should be more responsive to emerging changes and better equip librarians to act as partners and collaborators in research and scholarship. This position was strengthened with a recent Research Libraries UK report that argued research libraries should become active participants and leaders in the production of scholarly research.⁴⁴

In 2017, Hollister⁴⁵ reported that “the scholarly communication course is offered in about 15% of the American Library Association-accredited Master of Library and Information Science (MLIS) programs. A review of schools’ syllabi shows these courses offer a variety of overlapping topics that align well with the evolving research lifecycle needs of scholars and their institutions.” This is a relatively low proportion of MLIS courses. In their review of implementing Open Science policies in a university library in Finland, Jarmo Sarriti and colleagues advised that “The development of new open science and research support ser-

vices, infrastructures and tools would also require qualifications beyond those of traditional library skills.”⁴⁶ In the same year, Bonn, Cross, and Bolick observed that formal training on scholarly communication topics is uncommon in LIS courses; as a result, early-career practitioners tend to feel underprepared for work in this area.⁴⁷ The authors suspect that scholarly communication topics are also rarely taught explicitly in LIS courses in Australasia although are aware that some courses cover specific areas of scholarly communication such as Research Data Management, Digital Curation, and Research Methods. One of the objects of this study was to identify how respondents felt that their courses had prepared them for scholarly communication roles.

To understand the scholarly communication work undertaken in libraries in Australasia, an online survey of people working in scholarly communication was conducted.

Methods

An online survey was employed, as it would enable data collection from the geographically dispersed population of people working in scholarly communication around Australasia. For the purposes of this study, we define scholarly communication roles as roles that include the following areas: institutional repository management, publishing services, research practice, copyright services, open access policies and the scholarly communication landscape, data management services, and assessment and impact metrics (more detail below).

The three researchers worked as a team on each area of survey development. All three authors have lengthy practitioner experience in academic libraries, as well as academic backgrounds with multiple publications including scholarly communication. Two have faculty LIS teaching experience, one very recent; one has recently held a senior position in scholarly communication and faced significant challenges recruiting staff with scholarly communication competencies. It is this wide experience that has created their interest in scholarly communication skill development.

Questions in the survey were compiled using a number of sources. A recent survey titled “Impostor Phenomenon and Skills Confidence among Scholarly Communications Librarians in the United States” provided a starting point.⁴⁸ The original intention was to extend this research to Australasia to compare similarities and differences with the United States. However, close examination of the survey used by this US study revealed the following:

- The competency section was, in fact, our primary area of interest.
- Some areas of the study were not relevant in the Australasian context.

Thus, the focus of this paper is on aspects of the level of confidence that librarians working in scholarly communication have in their current competencies. Amendments were made to the aims and survey questions to develop a locally appropriate study. The focus is on questions of confidence in the core competencies of scholarly communication and the education and training background of the respondents, the latter to understand how respondents develop confidence in these core competencies. Questions related to impostor phenomenon were not included in this study. The demographic questions in the original impostor phenomenon study⁴⁹ were also not directly relevant to the Australasian community, so these were adapted. We included a question about the institution the respondent was working in. This potentially identifying information has only been used to understand the range of responses across institutions in Australasia and is not reported in the study or linked to any of the analyses we subsequently undertook.

Questions about confidence in competencies from Owens' study⁵⁰ were used with permission and some minor adaptations. In response to feedback after piloting the questionnaire, the options for the "reasons for having low confidence" were adapted to be shorter, with some responses from the original survey conflated, some removed, and others reworded to ensure clarity in the Australasian context. This reduced the list from 10 options to six.

Owens' study⁵¹ used the NASIG⁵² competencies as the basis for the questions. The research team undertook a comparative analysis of the NASIG and COAR (Confederation of Open Access Repositories) competencies⁵³ to inform their assessment of the competencies for inclusion in this study. No amendments were made to the sections on institutional repository management, publishing services, data management services, and personal strengths. We removed one of the copyright competencies ("Awareness of judicial environment"), as the language is not relevant in our context, and reworded the remaining competencies to ensure they could be recognized by the Australasian audience. Minor amendments were made to the wording of one of the competencies in assessment and impact metrics. We also chose to create two new sections: 1) open access policies and scholarly communication landscape, which consisted of five competencies that appeared on the COAR list but not the NASIG list; and 2) research practice, which consisted of three competencies similarly from the COAR list and three developed by the research team. We chose not to include any reference to Open Educational Resources because, in the Australian context, they relate to the learning and teaching domains rather than research support. Our analysis of the comparison is included in our online dataset.

The survey used Qualtrics software. Once the survey was approved by the Australian National University's (ANU) ethics process, the research team uploaded a webpage about the project online⁵⁴ with some information about the survey and a link to the participant information sheet, the survey instrument, and a list of the questions. The survey was piloted by two experts in the field of scholarly communication in Australia and the UK, and pilot feedback confirmed the terminology of the instrument, resulted in a number of minor clarifying changes, and assisted in confirming face and content validity. The ANU ethics panel required that no question would be compulsory; thus, not all respondents answered all questions. As a result, a pre-analysis was undertaken for each of the questions to determine the number of responses for each question. This analysis is included in our online dataset.

Participants were recruited through communication mediums used by the target cohort, including email lists, discussion groups, Slack channels, Twitter, and two relevant newsletters, one of which is distributed by the Council of Australian University Librarians and the other by the Australasian Open Access Strategy Group (now Open Access Australasia). To encourage participation, the research team offered a contribution to Kambri Scholars Program for each completed survey; as a result, a total of \$500 was donated. The survey period was extended to increase the number of responses from institutions where there had been either a single or no response. Recruitment emails were sent directly to librarians with roles listed as "research support" or similar, using publicly available email addresses on university web pages. The first completed response was received on 21 October 2020; the last was submitted on 3 December 2020.

In all, 160 valid responses were received and analyzed using Excel and descriptive statistics (for the quantitative questions) and NVivo and manual thematic coding (for the qualitative questions). Each member of the team took responsibility for analysis of different quantitative questions and coding of the qualitative questions, after which the team came together and

confirmed each other's work. Initial analysis of the confidence in competency areas included a set of specific tasks for each competency area from matrix questions. Initially, the results from these questions were individually analyzed for each competency area. These charts demonstrated the depth of information available from these sections of the survey. However, to conduct an analysis of each competency area in this way would be extremely detailed. It may be potentially useful for future decision making regarding future needs for education and training topics. However, given the broader purpose of this study, we analyzed the level of confidence the responses showed *across* a competency area by adding together all of the tasks listed in each competency area and then charting the total confidence for each competency area. Further information, including the survey instrument, is available in our online dataset.

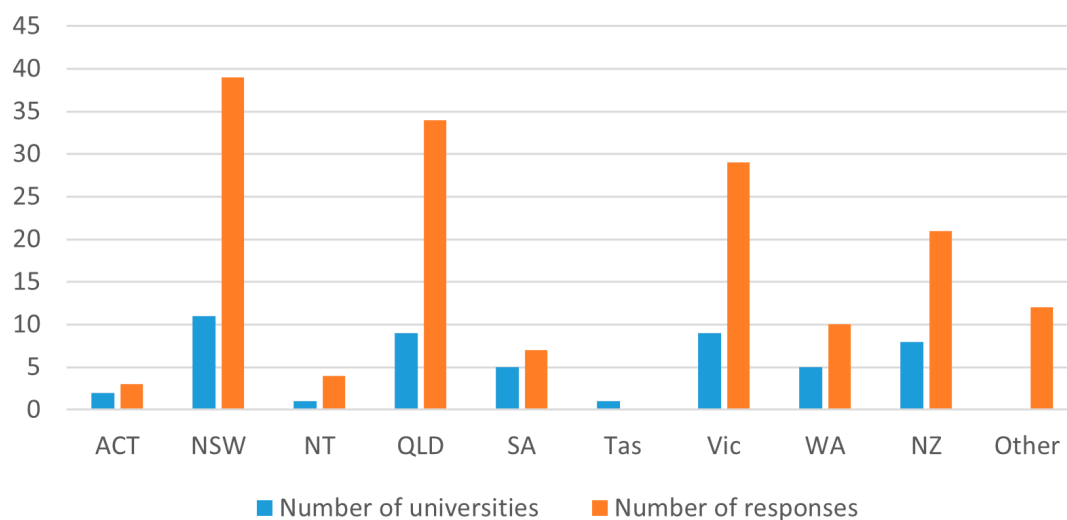
Results

Demographics

Of the 160 valid responses, 136 (85%) were from Australia and 24 (15%) were from New Zealand (NZ). Of the Australian responses, 126 were from universities and 10 were from other organizations that conduct research, such as hospitals and health services, government departments, and the National Library. Australian responses came from 37 of a potential 43 universities. Three Australian universities recorded more than 10 responses each, while seven recorded only one respondent. Responses came from seven of the eight New Zealand universities and two other New Zealand research institutions. Two responses recorded no location. We considered analyzing whether there were any major differences between the Australian and New Zealand responses to the confidence in competencies questions. After an initial analysis of the data management responses, where it was possible there would be some difference because of the developments in Australia initially fostered by the Australian National Data Service (ANDS) and more recently by the Australian Research Data Commons (ARDC),⁵⁵ there were no clearly identifiable differences so the countries were considered in aggregation. A summary of the location of responses is provided in figure 1 below.

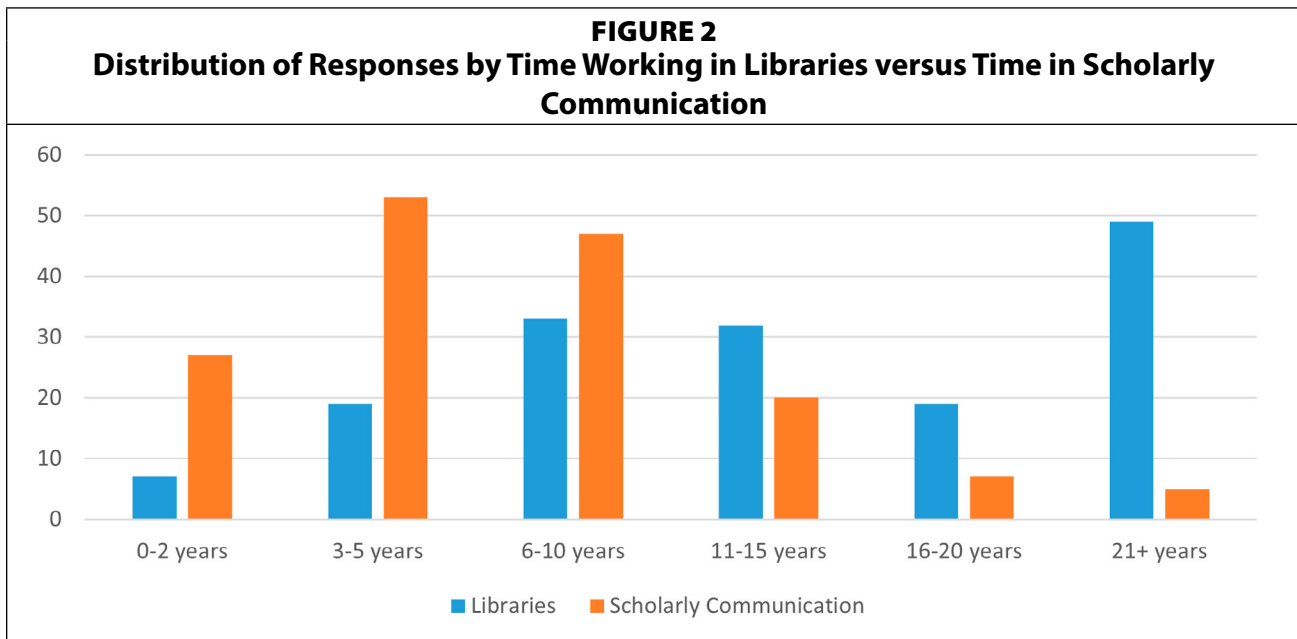
In Australia, in terms of the Higher Education Worker (HEW) classification as defined by the *Higher Education Industry—General Staff—Award 2020*,⁵⁶ slightly greater than one-third

FIGURE 1
Summary of Responses by Location



of respondents (35.1%) were at HEW6, with very few (6.7%) at a lower level. The authors are all from Australia and, when preparing the survey, asked New Zealand colleagues how to structure the employment levels for New Zealand respondents. However, these were not answered consistently, with the greatest response being *Not applicable*. One respondent from New Zealand noted at the end of the survey: “Just a note on pay—the scales presented were unfamiliar, so I was not able to indicate my pay band.” For this reason, these results do not include any detail on New Zealand respondents’ employment levels.

Almost one-third (30.8%) of respondents had been working in libraries for more than 20 years. Slightly greater than one-third (37.2%) had been working for 10 years or less. However, the distribution is considerably less uniform in terms of years spent working specifically with scholarly communication. One-third of respondents (33.3%) had worked between 3 and 5 years. Only 3.1 percent of staff with more than 20 years of library experience had been working in scholarly communication. Overall, nearly 80 percent of respondents had worked in scholarly communication for 10 years or less. In summary, the cohort represented a great level of experience in libraries, but experience in scholarly communication was mostly much more recent, as represented in figure 2.

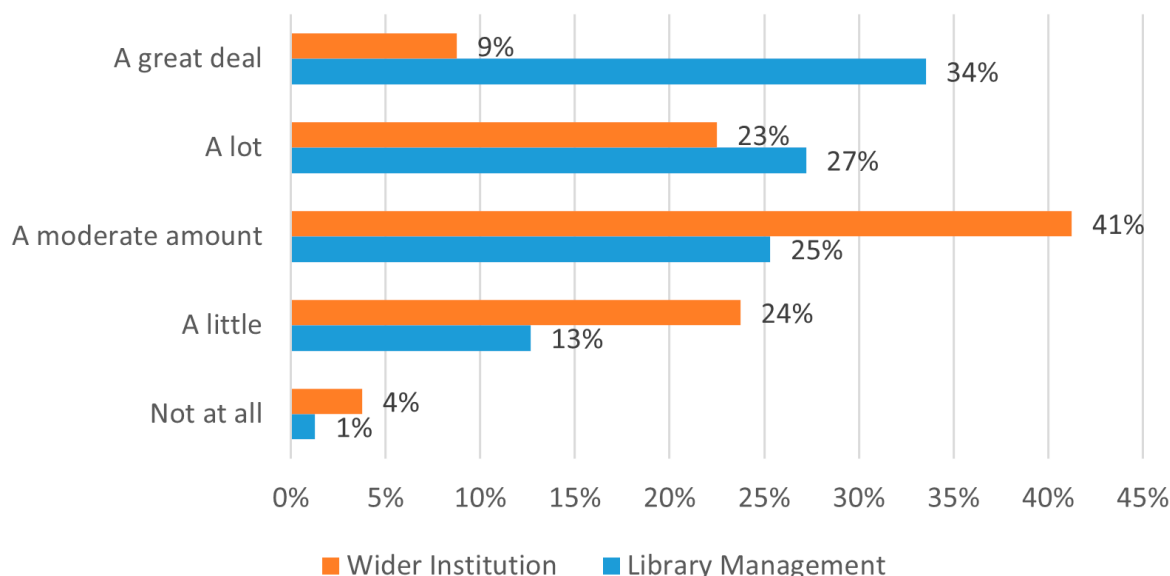


Nearly one-fifth (19.4%) of respondents reported spending 100 percent of their time on scholarly communication. Of the remaining approximately 80 percent, 82 respondents (or 80.4%) reported that scholarly communication was an important secondary responsibility in their position. For 19.6 percent, it was only a small part of their role. Overall, the level of responsibility for supporting scholarly communication was quite high among the respondents.

Support for Scholarly Communication

Staff were asked how well they felt that their library management, as well as the wider institution, supported them in their scholarly communication role. The results are represented in figure 3 below. Regarding support by library management, there were 158 responses, with an

FIGURE 3
Support for Scholarly Communication by the Wider Institution versus Library Management



additional 34 comments. On a Likert scale ranging from *A great deal* to *Not at all*, 53 respondents (33.54%) felt that library management supported them *A great deal*. Scores for *A lot* and *A moderate amount* were less but similar: 27.2 percent and 25.3 percent, respectively.

Regarding support by the wider institution, there were 160 responses, with an additional 31 comments. A total of 66 respondents (41.3%) felt that the wider institution provided moderate support. Scores for *A lot* and *A little* were less, but similar: 22.5 percent and 23.8 percent, respectively. Unlike support by library management, respondents ranked support by the wider institution extremely low for the value of *A great deal*: 8.8 percent.

A lack of knowledge about, and understanding of, scholarly communication work by library management is a repeated theme among the submitted comments. In some cases, there are inconsistent levels of support within library management. Interestingly, this contrasts quite sharply with other libraries in which staff feel actively supported by library management.

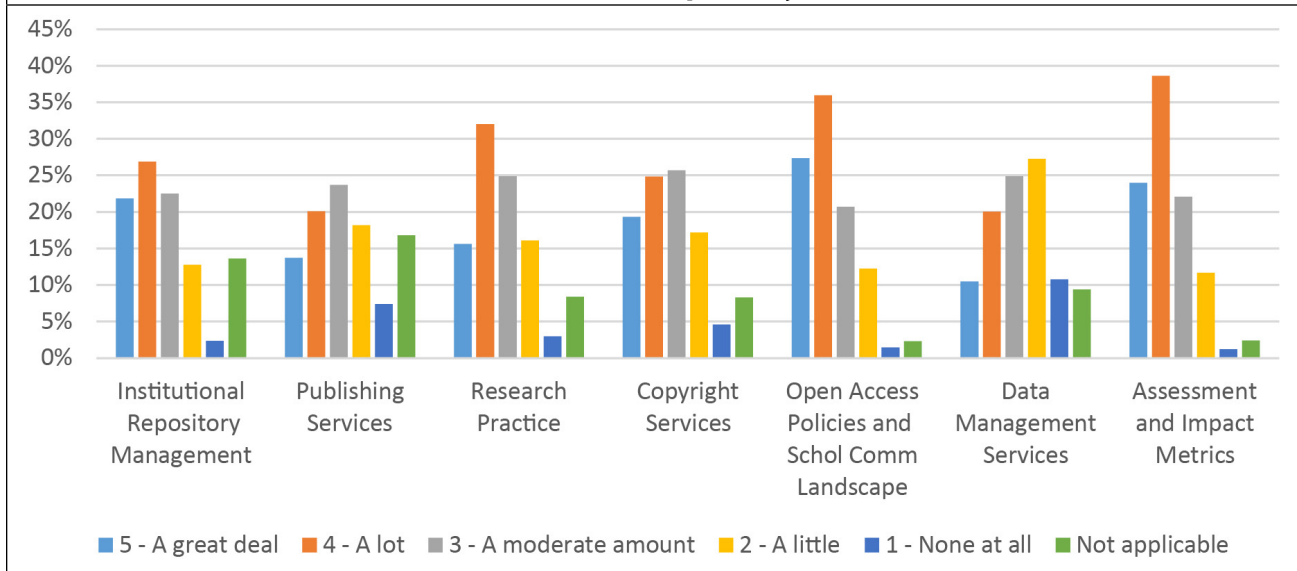
Comments about support from the wider institution indicate that, in some cases, a particular library's strategic goals and direction are aligned with those of the university, which in theory contextualizes any discussion about staff's roles and support. Several respondents, however, have equated library management with university management in terms of a perceived lack of interest and understanding of scholarly communication work by library staff. Two responses directly or indirectly allude to the Research Office, with which they felt there clearly could be a better relationship.

Confidence in Competencies

As described in the Method section, the competency areas were analyzed across the responses for each task, and this information is represented in figure 4.

By considering these comparative graphs across the competency areas, there are some insights that can be gleaned. It is not unreasonable to consider that library professionals working competently in a particular competency area would have either *A great deal* or *A lot*

FIGURE 4
Confidence in Competency Areas



of confidence in it. Looking at these combined confidence levels, however, only two competency areas had the majority of confidence levels as *A great deal* or *A lot*: open access policies and scholarly communication landscape (27.3% + 36.0% = 63.3%) and assessment and impact metrics (24.0% + 38.6% = 62.6%). Three competency areas showed lower confidence levels: institutional repository management (21.8% + 26.9% = 48.7%), research practice (15.6% + 32.0% = 47.6%), and copyright services (19.3% + 24.8% = 44.1%).

There were two competency areas where the positive confidence levels were considerably lower: publishing services (13.7% + 20.1% = 33.8%) and data management services (10.5% + 20.0% = 30.5%). The tasks listed under publishing services are more specialized and less aligned with traditional library tasks, and include *Knowledge of, and experience with, publishing platforms*; *Knowledge of, and experience with, the full life cycle of publishing*; *Possess a basic knowledge of relevant metadata schemata*; and *Collect and disseminate assessment metrics*. There were also some technical tasks, including *Perform system administration and programming* and *Collect and disseminate assessment metrics*. In many cases these roles are conducted by specialists and are not conducted by traditional academic librarians; therefore, it could be expected that these would be areas in which library professionals had less confidence. However, the low figure for data management services is potentially surprising, because there has been a concerted effort to improve the data management services across the sector since the former Australian National Data Service (ANDS) was established in 2008 and later subsumed into the Australian Research Data Commons (ARDC).

Reasons for Low Confidence in Competencies

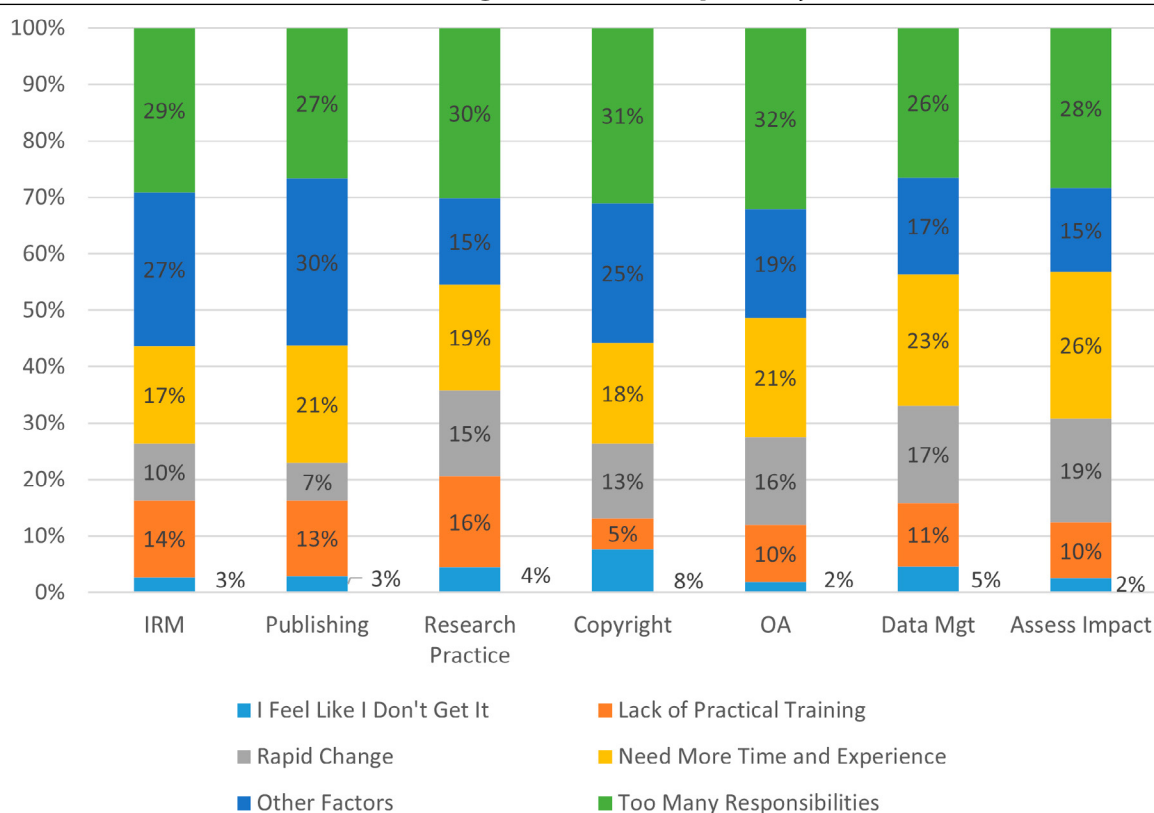
The people who were responding to the questions about competencies have responsibilities for this area of work; thus, it is valuable to explore further those people who do not feel confident in a particular task. Users who indicated *Moderate*, *Little*, or *No confidence* on any task in a competency area were then asked to consider factors affecting their confidence level. Users could select multiple suggested factors and could also add other influences ("Comments"). For the convenience of reporting, the six full-sentence factors suggested to survey participants have been assigned short descriptive names (see table 1).

TABLE 1
Short Names Assigned to Factors Impacting Confidence

Short Name for Reporting	Full Response Seen and Selected by Respondents
Need More Time and Experience	I am still new to working with the topic(s) and need more time/experience/training
Too Many Responsibilities	I have too many responsibilities and have not been able to devote enough time to the topic(s)
I Feel Like I Don't Get It	I have an insufficient understanding of the key concepts of the topic(s); I sometimes feel like I "don't get it."
Lack of Practical Training	I need practical/hands-on training that I have been unable to find, although I have conceptual understanding of the topic(s)
Rapid Change	I am unable to keep up with the rapidly changing information, standards, and/or practices in the topic(s)
Other Factors	Other factors (please describe)

Among six of the seven competencies, the one factor that was selected as most negatively impacting respondents' confidence levels was *Too Many Responsibilities* (see figure 5), with scores ranging between 26 and 32 percent. High impact was also attributed to two other factors: *Need More Time and Experience* and *Other Factors* (as identified in the comment box). In general, very few respondents felt a negative impact from an insufficient understanding of key concepts (in other words, *I Feel Like I Don't Get It*), with low scores ranging between 2 and 8 percent. Lack of practical training scored considerably less than the other factors (specifi-

FIGURE 5
Factors Averaged across Competency Areas



cally, between 10 and 16 percent), which has implications for the areas where training might be needed to build competency.

Each of the competency areas included a wide range of competency tasks. Other factors recorded in text by respondents for competencies for which they answered “moderate, little, or no confidence” were that the particular scholarly communication competency was not a core part of their role or was an area in which they do not regularly contribute or for which they hold less responsibility. Similarly, a number of respondents reported that, as they were supervisors or managers, they had a general overview but did not have detailed, practical, or hands-on experience or understanding. In some areas, particularly data management, assessment and impact measurement, copyright, and systems administration and other technical roles, respondents reported that these were roles conducted by specialists who are often in other parts of the university, such as the Research Office or Information Technology or legal department.

In a few cases, respondents reported that the particular competency was not relevant in their organization or were more critical, reporting that their university had outdated policies that needed changing or that their institution was not very engaged in particular scholarly communication fields (institutional repositories, copyright services, open access, research data management). These comments emphasize that, in Australasian universities, there is not something that may be called an overall *scholarly communication role*; instead, there are many roles in which people may become involved in one or more aspects of scholarly communication.

Qualifications

Library or Information Science Qualification

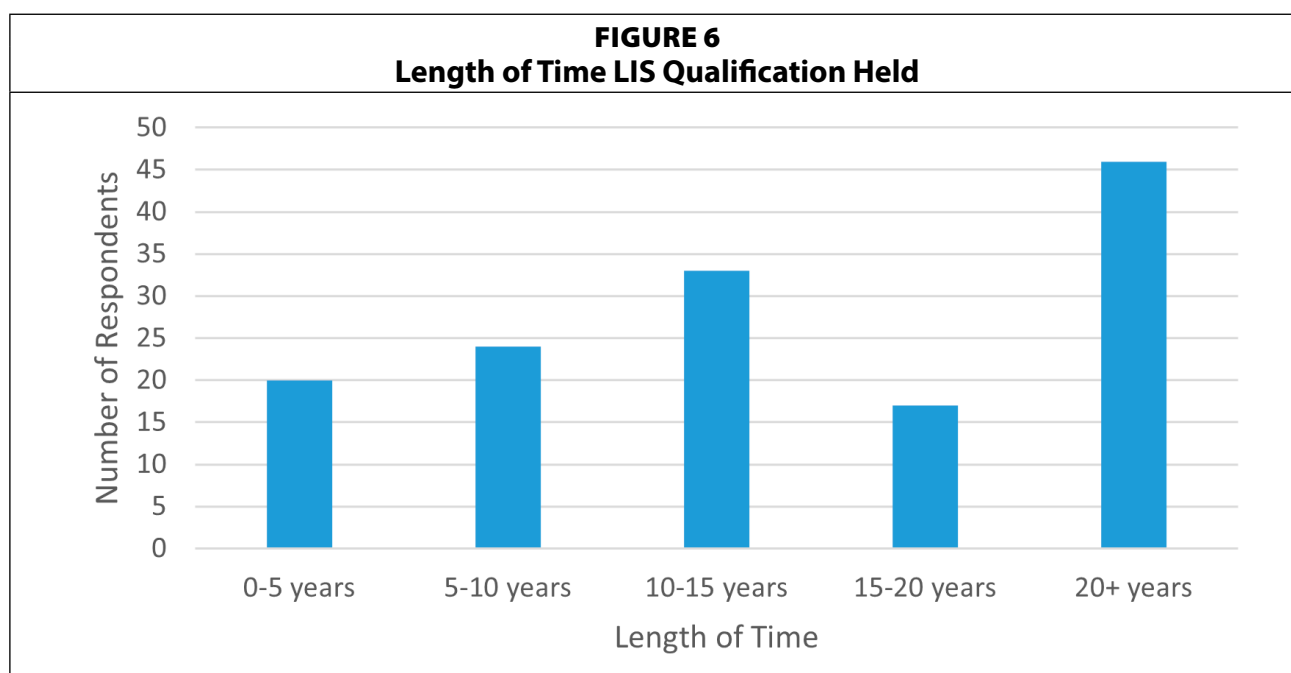
There are many ways by which respondents might learn scholarly communication competencies. For example, they might be covered in the qualifications held by respondents, such as a library and information studies (LIS) qualification. Nearly 9 out of 10 (88%, $n = 141$) participants held an LIS qualification, and a further 1.8 percent ($n = 33$) of participants were studying for such a qualification. Only 10 percent ($n = 16$) did not hold an LIS qualification. The initial call for respondents included anyone working in scholarly communication; this potentially encompassed people working outside the library sector (for example, in Research Offices).

Of those who answered the question about the length of time they had held their LIS qualification ($n = 140$), 96 respondents (nearly 60%) had held it for more than 10 years, as shown in figure 6.

Participants who have an LIS qualification were asked if their LIS qualification equipped them with the knowledge required to work in scholarly communication. Of the 122 respondents to this question, a slight majority answered *No* (57.4%, $n = 70$) and 92 took the opportunity to comment. Twenty-five respondents were critical that scholarly communication knowledge and skills were not included in their degree at all, and they did not feel well equipped when taking on such a role. For example:

My LIS qualification barely touched on scholarly communication issues ...

My qualification ... felt overly basic and general, not offering much depth at all about the complexities of scholarly communication, emerging platforms, the changing landscape in university libraries, etc.



The course itself however didn't teach me much/anything about what I actually do at work. It's been a steep learning curve.

And one shared that they felt this was an ongoing issue:

My experience with work placement students is that they do not get great insight into scholarly communications. This is a crying shame, not just for their own professional development, but for the industry. We need graduates who are aware of the big issues and who have knowledge in emerging and current issues in Scholarly Communications. Just look at the impact COVID had on publishing!

Other *No* respondents offered reasons, such as that their qualification was obtained too long ago ($n = 16$) and the scholarly communication landscape is constantly changing, the implication being that what is learned in a course at one point in time may change very quickly.

Scholarly Communication wasn't covered in my course at all. Admittedly, I finished my course in 1996.

However, some *No* respondents and most of the *Yes* respondents acknowledge the important role of their LIS qualification in providing a foundation to a discipline: for example, enabling them to "learn how to learn" or to gain a position that in turn enabled continuous learning:

My qualification helped me to gain the positions I've held, and these positions have provided me with the training and knowledge in the area of scholarly communication. So while I don't believe my studies gave me the direct knowledge, they were still an essential part of my development in this area.

Other Qualifications

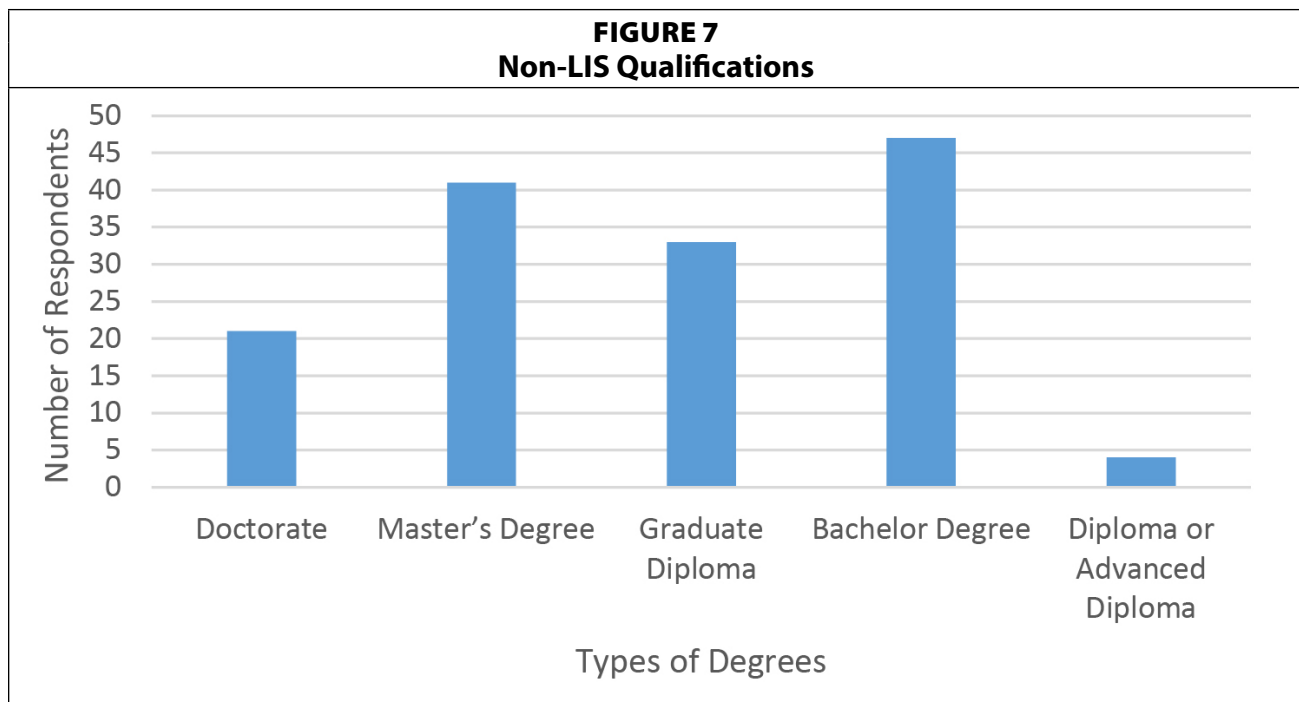
Other qualifications may also provide knowledge about, and competencies in, scholarly communication. More than 8 out of 10 (81.3%, $n = 130$) of respondents had a qualification other than LIS, with 1.9 percent ($n = 3$) working toward one, and only 16.9 percent ($n = 27$) not having an additional qualification. Of those who had an additional qualification, the majority had postgraduate degrees, either a graduate diploma or master's degree (50.7%, $n = 34$) or a doctorate (14.4%, $n = 21$) (see figure 7 below).

These respondents were also asked if their other qualification had equipped them with the knowledge required to work in scholarly communication; 67.2 percent ($n = 84$) said *Yes*, and 32.8 percent ($n = 41$) said *No*. As there were a range of disciplines recorded including arts, education, and humanities; health informatics and nursing; business and information systems; and science and mathematics as well as a range of degree levels, there was a wide variety of responses as to whether these degrees had assisted them in their scholarly communication roles. Whereas some people who had done research degrees noted that these had been useful, others observed that the usefulness was often limited to a specific discipline. One research qualified respondent noted:

I understand first-hand the scholarly writing and publishing process, although I have learned more about research metrics and journal rankings as a professional staff member than I did when I was research active.

And another:

Part of the problem librarians face in this area is the issue of universities being hierarchical institutions where the PhD is a piece of cultural capital that is often necessary to be taken seriously by academics. I don't think my PhD will make me a better librarian but it will make them think I am a better librarian!



Respondents with degrees in education noted that these helped them with communication and designing and teaching scholarly communication workshops.

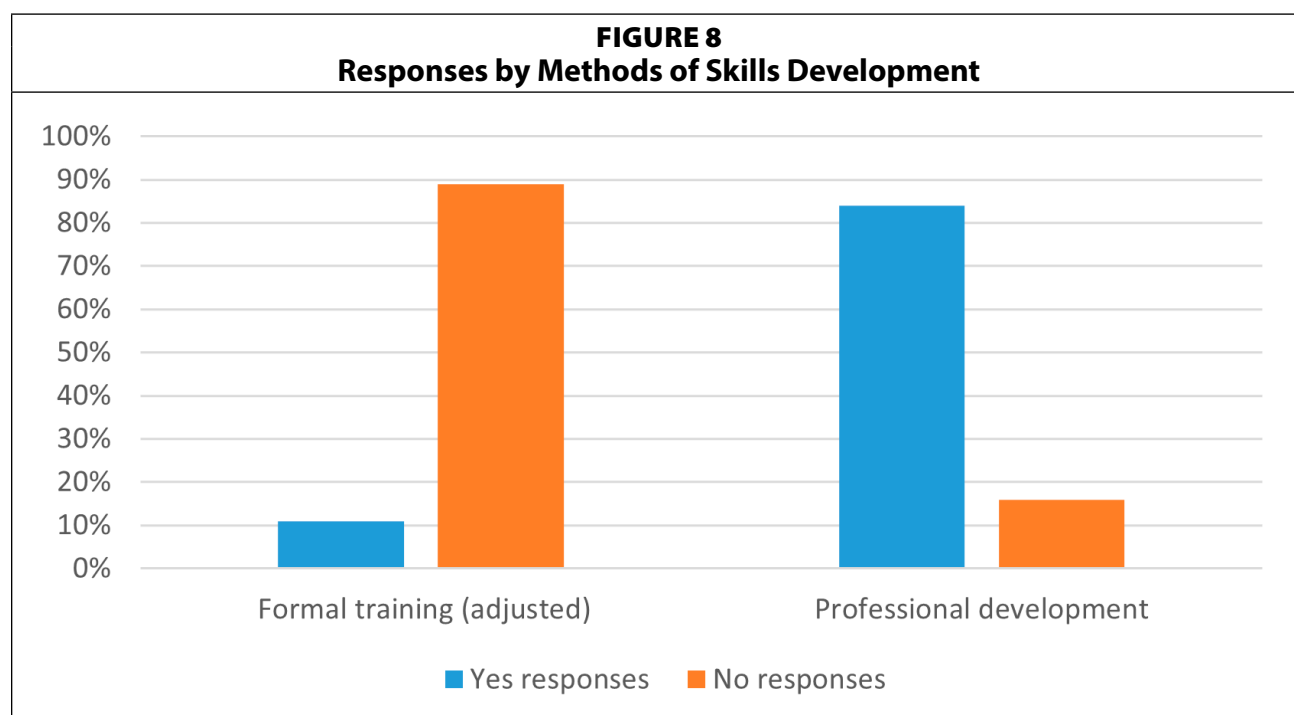
In reflecting on the role of their LIS and other qualifications in their scholarly communication work, many also observed that a qualification was not the end of learning. Furthermore, they stressed the importance of learning throughout their employment, through both formal professional development and informal learning:

It is an evolving and changing landscape where a qualification does not necessarily equip you with the knowledge required. To be professionally active in this area and to continuously build my knowledge are required to effectively work in the current scholarly communication environment.

Training and Professional Development

The survey asked three questions about knowledge and skills acquisition beyond the respondents' degrees. These were separated into questions about *formal training*, *professional development*, and *self-directed learning*. The responses to these three methods of skill acquisition varied considerably; figure 8 below demonstrates the variance between *formal training* and *professional development*.

While there was some descriptive text to explain each of these categories, the respondents appear unclear about the distinction between them, with people nominating "23 research things" (a self-directed training concept) as *formal training* rather than *self-directed learning*. Similarly, another respondent nominated Leiden University's CWTS course on Bibliometrics and Scientometrics for Research Evaluation as *professional development* rather than *formal training*.



Formal Training

The responses to the question about whether respondents had formal training related to the scholarly communication aspects of their jobs were interesting. Despite there only being 160 respondents, there were 161 responses because one person answered both *Yes* and *No* to this question. Of these, there were 32 *Yes* responses (20% with 23 comments) and 128 *No* responses (80% with 5 comments). While this is already heavily weighted to a lack of formal training received, further analysis of the comments identified that the situation was more marked.

The question defined *formal training* as “courses with a structured plan that have some formal recognition upon completion, e.g., participation certificate or certification” and is within the definition of scholarly communication of the study. However, 14 of the 23 comments related to a *Yes* response referred to a course that would not fit the defined criteria. For example, four people described courses that are not within the areas of scholarly communication as defined by this study, such as the Lean Six Sigma Green Belt in project management, or the Digital Preservation Coalition’s Novice to Know-How course. Therefore, of the 32 people who had responded *Yes*, at least 14 are not in actuality formal training or certification courses. This amends the proportion of responses to 18 *Yes* (11.3%) and 140 *No* (88.7%). It is highly probable that some of the respondents who chose *Yes* but did not comment would also have had in mind courses and/or training that does not meet the *formal training* criteria for this survey.

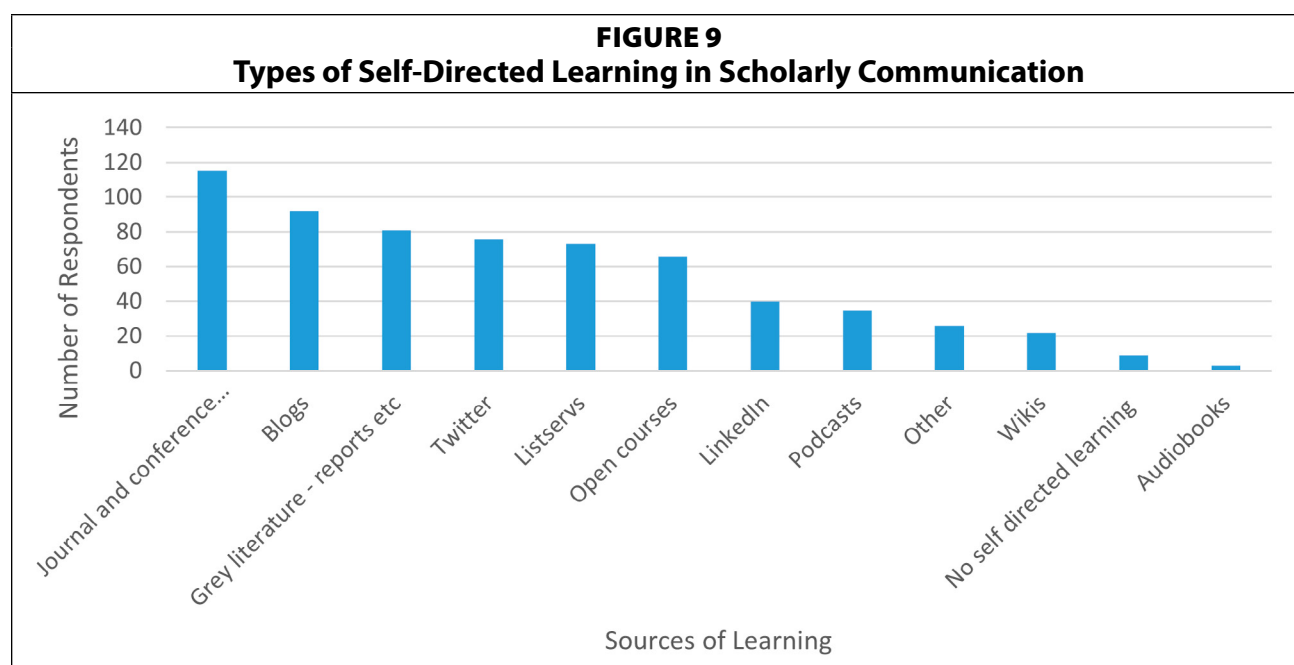
Professional Development

There were multiple responses that identified the value of professional development for contextualizing the work that staff were doing, such as: “Webinars have also been a useful way of understanding the broader context for scholarly communication issues, rather than just what is happening at my own institution” and “[I] Attended eResearch Australasia conference—was relevant and allowed me to gain a broader understanding of current issues and opportunities.”

Multiple people commented on the value of conferences from the perspective of networking as well as developing and maintaining a community of practice. In the question about professional development, the respondents volunteered a range of information. Conferences were specifically mentioned in 32 of the 95 comments, with the Research Support Community Day and the CAIRSS Research Repository Days being mentioned multiple times. The most mentioned form of professional development was webinars, appearing in nearly half of the comments. This might be partly because of the nature of work during 2020 prior to the survey. Organizations that specifically exist to support scholarly communication were named by multiple respondents: Open Access Australasia⁵⁷ and ARDC. Several people also identified specific library training offered by professional associations.

Self-Directed Learning

The responses to the question about self-directed learning asked respondents to indicate what types of learning they are currently interacting with; participants could tick as many as were relevant. These responses are described below in figure 9, indicating that *journal and conference papers* are the most used, followed by *blogs* and *grey literature*.



There were considerably fewer comments associated with this question, but of the 24 people who did comment, nine mentioned webinars and two mentioned conferences. These are probably more appropriate for *professional development* rather than *self-directed learning*.

When asked about the average number of hours per week they spent on staying up to date through self-directed learning, the majority of respondents (68%) spent less than two hours. Several shared the same approach: scanning email updates on scholarly communication from journals as well as colleagues. For several, the challenge was that they work part-time. Others found it difficult to quantify the time allocated because it varies according to their workload each week. All respondents who commented recognized the value of staying up to date in a “space [that] changes so rapidly.” However, as one person so aptly put it, “Like the researchers, I too am very time poor.”

The survey included two questions about participation in the scholarly publication process. Unfortunately, there was an error in the configuration of the survey. This meant the second question that asked if participating in the scholarly publication process helped equip them with the knowledge required to work in scholarly communication was not displayed, so no results were recorded for that question. For this reason, neither of the questions is reported in this paper.

Many of the optional comments at the end of the survey reiterated aspects of the survey such as a lack of time and different learning pathways. One person noted: “It is important for LIS students to be made more aware of this aspect of librarianship.” A couple mentioned an appetite for a community of practice and “participating in any new Australian capacity-building programs or initiatives that come out of it.” By far, the majority of the comments referred to a need for better recognition and understanding of this type of work as “management work” because it is an “emerging area” and there is “little understanding.”

Discussion

Through considering the level of confidence in required competencies of people working in scholarly communication, this study intended to provide insight into the workforce in

Australasia. As such, it builds upon studies previously undertaken by Sewell;⁵⁸ Bonn, Cross, and Bolick;⁵⁹ and Owens.⁶⁰ The changing nature of the research endeavor has generated new requirements for research support. As a result, staff working in these roles require new sets of skills to support open access to research outputs, research data management, FAIR data, reproducibility, and copyright assistance. While aspects of scholarly communication work have long been a part of a librarian's role, the specific role of "scholarly communication librarian" emerged as a new position title in 2011.⁶¹ This is reflected in the relatively short length of time respondents to our study have been working in scholarly communication, with just over 50 percent of respondents working in the field for five years or less. Sewell's study was undertaken four years before ours and showed at the time that 65 percent of current roles in scholarly communication had been established in respondents' organizations for less than five years, with fewer than 15 percent having been established for more than 10 years.⁶² This almost directly correlates with Owen's finding that 87.2 percent of respondents had been working in scholarly communication for less than 10 years.

This result contrasts with the length of service in libraries, with the majority of respondents (62.8%) working in libraries for more than 10 years, including almost one-third (30.8%) having worked in libraries more than 20 years (see figure 2). The general pattern of an inverse relationship between time spent working in libraries against time spent in a scholarly communication role was also shown in Owen's study, where just over half of respondents (53%) had been in libraries for more than 10 years.

The nature of work in scholarly communication requires interacting with the academic community, often in an advocacy role. Indeed, there is work underway to recognize academic and research libraries as active participants and leaders in the production of scholarly research.⁶³ Given the large number of respondents employed in scholarly communication at a relatively low level of HEW6 or below (41.8%), this is challenging and requires a relatively high level of confidence. Generally, we found that looking across the combined competency areas, at face value the responses appear to be weighted toward the confident side of the scale. However, there are only two areas where the majority of confidence levels were *A great deal* or *A lot*: open access policies and scholarly communication landscape and assessment and impact metrics. In every area there are a proportion of people who do not have confidence in the area, and in the cases of publishing services and data management services, the confidence levels were considerably lower. As with Owens' results, these findings reflect the wide degree of variation in survey responses. However, Owens did not have open access policies and scholarly communication landscape as a competency area.

It can be insightful to understand what barriers staff may be experiencing to gaining higher levels of confidence. For example, the nature of their role often appears to be a factor. In the majority of cases, the respondents combined their scholarly communication tasks with other roles. Only 19 percent of the respondents' roles were completely devoted to scholarly communication, with the greatest number of respondents (43%) only spending 25 percent of their role on these tasks. This is in almost inverse proportion to the Bonn, Cross, and Bolick study, which indicated only 14 percent of respondents had "other" responsibilities than scholarly communication, where 72 percent of those indicated those duties were a primary part of their job. The inference from this is that 86 percent of respondents to that study had scholarly communication as their primary focus.⁶⁴ Owen's study also surveyed librarians in the United States and found 61.1 percent of respondents reported that scholarly communications was their

primary role, and the other 38.9 percent indicated that scholarly communications was an important secondary responsibility with 53 percent of respondents allocating more than half their time to specializing in scholarly communications.⁶⁵ The Sewell study did not ask this question.

Owens' study found *too many responsibilities* was the highest factor identified as a factor negatively impacting respondents' confidence levels at 24 percent across all competency areas, leading her to suggest: "Library directors should consider how the sheer scope of a scholarly communications librarian's responsibilities may impact the manifestation of impostor phenomenon and a librarian's lack of confidence in key skills areas."⁶⁶ As demonstrated above, the Australasian respondents in our study are managing scholarly communication among a considerably higher proportion of other responsibilities, so the finding that *too many responsibilities* ranged from 26 to 32 percent for our study (see figure 5). In addition, the high response to *need more time and experience* indicates that there needs to be a greater consideration of the challenges associated with remaining up to date in these fast-moving areas for relevant staff.

Allowing a greater amount of time for people working in scholarly communication to increase skills is a consideration that will need to be made by their immediate work environment. Indeed, increasing the proportion of staff roles to focus on scholarly communication and releasing them from other responsibilities needs to be given serious consideration in Australasia. This would be easier if there were some recognition of the importance and complexity of this work by the wider institution. Respondents indicated in inverse proportion their perceived level of support for scholarly communication from both library management and the wider institution. This indicates that, while there may be a higher level of support locally, this is not matched by the support from the institution as a whole (see figure 3). The nature of this type of work involves the development of cross-campus relationships to support research, such as with the Research Office and Information Services, a skill described as "social interoperability" by Bryant, Dortmund, and Lavoie in 2020.⁶⁷ There is some import for senior library management to consider the value of leveraging scholarly communication as a means of increasing their library's role in broader cross-campus partnerships. This type of strategic collaboration has been recommended as an outcome from a survey of 300 researchers and interviews with senior members of research offices in the United States, the United Kingdom, and Australia, which recommended open access, identifying publications of researchers, and creating and updating researcher profiles as "key opportunities for more strategic collaboration between the research office and library."⁶⁸

Providing the opportunity for developing skills and knowledge is one issue. The availability of opportunities is another. The survey considered several approaches to skill and knowledge acquisition, including formal education. Given the length of service of the respondents, many undertook their original LIS qualification some years ago, with nearly 60 percent holding their qualification for 10 years or more. The response that a majority (57.4%) indicated that their LIS qualification had not equipped them to work in scholarly communication could be a reflection that this is a relatively new field. These findings are similar to those of Sewell; in her survey, 49 percent had held their LIS qualification for 10 years or more and 56 percent felt that this qualification had not equipped them with appropriate knowledge of scholarly communication.⁶⁹ The findings were even starker in the work of Bonn, Cross, and Bolick, where the respondents to their survey indicated a mean of 12.4 years since graduation from their degree with a "shared experience among most (77%, 122 of 158) that no course on scholarly communication was offered during their graduate education."⁷⁰

However, some of the responses in the comments in this survey indicated a level of frustration about their qualification. This could be a reflection of the previously low level of reference to any scholarly communication skills that ALIA lists in the *Foundation Knowledge, Skills and Attributes Relevant to Information Professionals Working in Archives, Libraries and Records Management*, which forms the basis of LIS degrees in Australia.⁷¹ As scholarly communication and other research support services have now been included as an element of foundation knowledge by ALIA,⁷² LIS Education programs now need to consider adding it more explicitly to their programs. It should be noted that, while not related to the formation of LIS degrees, the ALIA *Health Library Association (HLA) Competencies* do specifically mention scholarly communication tasks, including “data science, research data management,” “promoting scholarly communication,” “promoting open science and open access to government-funded research outputs,” “content, learning, research data, repository, and database management systems,” and “digitisation and digital repository management.”⁷³

The respondents to this survey were very highly qualified. More than 80 percent of respondents had a qualification other than an LIS degree, with the majority being postgraduate degrees. More than 1 out of 10 (14.4%) have doctorates (see figure 7). This result was similar to the responses in the 2020 Bonn, Cross, and Bolick study, where 12 percent held a PhD and 11 percent had a JD.⁷⁴ Our study asked whether other qualifications equipped respondents with the knowledge required to work in scholarly communication, to which they answered in a two-third *Yes*, one-third *No* split. The Bonn, Cross, and Bolick study focused on curricula and did not ask this question. One of our respondents commented that having a PhD gave them a level of gravitas when talking to academics. This is related to issues librarians encounter when not being perceived as scholarly communication experts.

A discussion about the value of an LIS degree as opposed to a higher degree in another field to those people working in scholarly communication is one that could be interesting to explore further. Regardless, while an LIS qualification is one method by which skills and knowledge can be gained, there is also an ongoing need to stay relevant and up to date. Our study showed a strong weighting to *professional development* over *formal training* (see figure 8). There is an overwhelmingly low number of people working in scholarly communication in Australasia having any formal training in the area. This is also reflected in the findings of the Bonn, Cross, and Bolick study, where fewer than 10 percent of respondents indicated they were pursuing additional education through a formal degree or certificate.⁷⁵

The lack of formal scholarly communication training among the respondents is likely a reflection of a lack of opportunity. The few courses identified in the question on formal training all incur a cost. The survey did not ask this question, but given other studies looking at the cost of professional development for academic libraries,⁷⁶ it could be an enlightening follow-up to understand whether these costs are being met in Australasia by the individual or their employer. In the case of Owen’s US survey, respondents cited lack of funding for training as an important factor that contributed to their lack of confidence in some competencies.⁷⁷

There is evidence that, over the past decade, people working in LIS have taken multiple approaches to remaining up to date, including mentoring, writing for publication and “managing the management.”⁷⁸ Other approaches have included committee work, cultivating mentors, and informal discussions with colleagues.⁷⁹ In addition, other research demonstrated that taking advantage of training and development reduced the sense of impostor phenomenon in people working in scholarly communication.⁸⁰ Our study supported this; while there appears

to be a serious lack of formal training opportunity in scholarly communication, practitioners are resourceful and take advantage of conferences and webinars. The perceived value of conference attendance appears to be high, and there is a strong engagement with organizations such as Open Access Australasia and ARDC. It is possible that conferences and webinars are popular as they can be timely and targeted, given respondents used expressions such as “a fast-moving and diverse area such as this” and “useful in keeping up with such a quick-moving and varied research environment.” In addition, “keeping up to date” and “understanding new trends” appeared several times.

The next two most commonly used professional development resources in our study after *journals and conferences* were *blogs* and *grey literature*. This is reflected in the Bonn, Cross, and Bolick study where *conferences* equaled *articles and book chapters* as the most common types of resources used to continue their education, with 27 percent each.⁸¹ Respondents to our study are generally (68%) spending less than two hours a week on different types of informal learning. However, given the constraints on time identified earlier in the survey, it appears there is a time opportunity-cost in this practice.

This work has identified multiple areas where improvements could be made in relation to the professional development and support of those working in scholarly communication in Australasia.

Limitations

The study had intended to ask those people who had higher degrees whether participating in the scholarly publication process had helped equip respondents with the knowledge required to work in scholarly communication. However, a glitch in the flow of the survey meant this question did not appear. It remains a valid question.

Given the apparent confusion by respondents around whether a course or event classified as professional development or formal training, the definitions of what these meant within the survey should have been clearer. The study did not ask what type of LIS qualification the respondents held—bachelor’s degrees, graduate diplomas, or master’s. Future work in this area should make this distinction.

All research methods have limitations; thus, we must acknowledge limitations of questionnaire-based research such as this. While they enable researchers to recruit respondents from wide geographic areas and multiple organizations, in a nonprobability sample such as this, where potential respondents can choose whether or not to participate, results cannot be generalized, although they can provide insight into the problem under investigation.

Future Study

This research opens up further questions. One area that warrants exploration is the practical need for people working in this area to “manage up” to advocate for the strategic imperative of scholarly communication work. This is work that is primarily focused on the research community, but there is also work within the library, given the low general level of understanding of scholarly communication issues. The relatively lower level of the staff working in this area is a greater challenge and relates to having to justify their existence.

In addition, a deeper analysis of the correlation between confidence levels and the academic or training background of the respondents could evaluate the direct effect of education and training, identifying where energy should be directed into the future. The authors have

made the raw data set available for any other researcher who wishes to undertake their own analysis. One view could be a cross-reference between those comments that a respondent was frustrated with their LIS qualification and the length of time since that qualification was gained. This could potentially identify if there remains an issue with the level of instruction with more recent degrees or if that is a historical reflection.

Conclusion

Given that research practice and technology are constantly evolving and there is a globally and locally increasing focus on open research, scholarly communication practice is also constantly evolving. These changes in practice and focus make scholarly communication an increasing imperative for research institutions, which will require qualified, confident, and up-to-date staff. In addition, arguments that academic libraries should be active participants in the production of scholarly research further indicates the need for academic libraries to be looking at the skills and knowledge of their staff in order for them to be prepared for these future challenges.

Responses also indicate that the sector needs to provide structured training and professional development opportunities that keep staff up to date with the constant change and that are recognized by professional organizations such as ALIA and ARMS. In addition, there is a clear appetite for a community of practice and Australasian capacity-building programs or initiatives. In both instances, this needs to be addressed at a national level, potentially through existing professional organizations or through the development of a new scholarly communication-focused group.

The findings in this study also have implications at an institutional level because they bring weight to the argument that staff working in scholarly communication need to be further recognized by institutional central administration as a strategic imperative for research institutions. This can happen in multiple ways, including academic libraries recognizing the breadth and complexity of the area of scholarly communication, in both reducing the external workload for those people working in the area and also increasing the proportion of academic library staff whose responsibilities encompass scholarly communication.

Acknowledgment

The authors would like to acknowledge the Australian National Centre for the Public Awareness of Science for their assistance with and hosting of a webpage about the project: <https://cpas.anu.edu.au/research/research-projects/scholarly-communication-knowledge-and-skills-australasian-research>

Notes

1. Christian Gumpenberger, Martin Wieland, and Juan Gorraiz, "Bibliometric Practices and Activities at the University of Vienna," *Library Management* 33, no. 3 (1 January 2012): 174–83, <https://doi.org/10.1108/01435121211217199>.
2. Heather Moulaison Sandy, Anthony J. Million, and Cynthia Hudson-Vitale, "Innovating Support for Research: The Coalescence of Scholarly Communication?" *College & Research Libraries* 81, no. 2 (2020): 193.
3. Andrew M. Cox et al., "Maturing Research Data Services and the Transformation of Academic Libraries," *Journal of Documentation* 75, no. 6 (2019): 1432–62.
4. Andrew Cox, "Academic Librarianship as a Data Profession: The Familiar and Unfamiliar in the Data Role Spectrum," *ELucidate* 15, no. 1/2 (2018): 49.
5. Erin Owens, "Impostor Phenomenon and Skills Confidence among Scholarly Communications Librarians

in the United States," *College & Research Libraries* 82, no. 4 (2021): 490, <https://doi.org/10.5860/crl.82.4.490>.

6. Anthony J.G. Hey, Stewart Tansley, and Kristin Michele Tolle, *The Fourth Paradigm: Data-Intensive Scientific Discovery*, vol. 1 (Redmond, WA: Microsoft Research, 2009); Laura Saunders, "Core Knowledge and Specialized Skills in Academic Libraries," *College & Research Libraries* 81, no. 2 (2020): 288.

7. N. Haltas and C. Devereux, "Report on the Consultation Workshop Skills and Human Resources for E-Infrastructures within Horizon 2020," *Undefined* (2012), paper/Report-on-the-Consultation-Workshop-Skills-and-for-Haltas-Devereux/bcfa2dcd24f8adf353c6f7ceb0afcff78a3fa872.

8. Bianca Kramer and Jeroen Bosman, "Innovations in Scholarly Communication: Global Survey on Research Tool Usage," *F1000Research* 5 (18 April 2016), <https://doi.org/10.12688/f1000research.8414.1>.

9. M. Wolski, Louise Howard, and J. Richardson, "The Importance of Tools in the Data Lifecycle," *Digital Library Perspectives* (2017): 249, <https://doi.org/10.1108/DLP-11-2016-0042>.

10. Nancy Maron et al., *Open and Equitable Scholarly Communications: Creating a More Inclusive Future* (Chicago, IL: Association of College and Research Libraries, 2019), <https://doi.org/10.5860/acrl.1>.

11. Liat Klain-Gabbay and Snunith Shoham, "Scholarly Communication and Academic Librarians," *Library & Information Science Research* 38, no. 2 (2016): 170–79.

12. I. Diane Cooper and Janet A. Crum, "New Activities and Changing Roles of Health Sciences Librarians: A Systematic Review, 1990–2012," *Journal of the Medical Library Association: JMLA* 101, no. 4 (October 2013): 268–77, <https://doi.org/10.3163/1536-5050.101.4.008>.

13. Jeremy Atkinson, "Academic Libraries and Research Support: An Overview," *Quality and the Academic Library* (2016), 135–41.

14. Sheila Corral, Mary Anne Kennan, and Waseem Afzal, "Bibliometrics and Research Data Management Service: Emerging Trends in Library Support for Research," *Library Trends* 61, no. 3 (2013): 636–74.

15. Tibor Koltay, "Data Literacy for Researchers and Data Librarians," *Journal of Librarianship and Information Science* 49, no. 1 (1 March 2017): 3–14, <https://doi.org/10.1177/0961000615616450>; Gaby Haddow and Jayshree Mamtara, "Research Support in Australian Academic Libraries: Services, Resources, and Relationships," *New Review of Academic Librarianship* 23, no. 2/3 (2017): 89–109; Lisa M. Federer, Ya-Ling Lu, and Douglas J. Joubert, "Data Literacy Training Needs of Biomedical Researchers," *Journal of the Medical Library Association* 104, no. 1 (January 2016): 52–57.

16. Cox et al., "Maturing Research Data Services and the Transformation of Academic Libraries."

17. Ada Ducas, Nicole Michaud-Oystriky, and Marie Speare, "Reinventing Ourselves: New and Emerging Roles of Academic Librarians in Canadian Research-Intensive Universities," *College & Research Libraries* 81, no. 1 (2020): 43.

18. Ngoc-Yen Tran and Emily K. Chan, "Supporting Scholarly Research: Current and New Opportunities for Academic Libraries" (2020); Steve Brantley, Todd A. Bruns, and Kirstin I. Duffin, "Librarians in Transition: Scholarly Communication Support as a Developing Core Competency," *Journal of Electronic Resources Librarianship* 29, no. 3 (2017): 137–50; Klain-Gabbay and Shoham, "Scholarly Communication and Academic Librarians."

19. Andrea M. Ketchum, "The Research Life Cycle and the Health Sciences Librarian: Responding to Change in Scholarly Communication," *Journal of the Medical Library Association: JMLA* 105, no. 1 (2017): 80.

20. Sandy, Million, and Hudson-Vitale, "Innovating Support for Research."

21. Mary Auckland, "Re-Skilling for Research," RLUK Report (Research Libraries UK, 12 January 2012), <https://www.rluk.ac.uk/re-skilling-for-research/>.

22. Todd Bruns, John Stephen Brantley, and Kirstin Duffin, "Scholarly Communication Coaching: Liaison Librarians' Shifting Roles," in *The 21st Century Library: Partnerships and New Roles* (Washington, DC: Rowman & Littlefield Publishers, 2015), 9–29, https://thekeep.eiu.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1100&context=lib_fac.

23. Mary Anne Kennan, "Data Management: Knowledge and Skills Required in Research, Scientific and Technical Organisations" (2016), 7.

24. Hannelore Vanhaverbeke, Barbara Lanchos Barrantes, and Andrew Cox, "Don't Stop Thinking about Tomorrow!—Future Competencies in Bibliometrics," *The Bibliomagician* (blog, 15 March 2021), <https://thebibliomagician.wordpress.com/2021/03/15/future-competencies-in-bibliometrics/>; Andrew Cox and Sabrina Petersohn, "Competency Model for Bibliometric Work," *The Bibliomagician* (blog, 2 October 2017), <https://thebibliomagician.wordpress.com/competencies/>.

25. Birgit Schmidt and Kathleen Shearer, "Librarians' Competencies Profile for Research Data Management" (June 2016), https://www.coar-repositories.org/files/Competencies-for-RDM_June-2016.pdf.

26. Pascal Calarco et al., "Librarians' Competencies Profile for Scholarly Communication and Open Access" (2016), 6.

27. Association of College & Research Libraries, "Framework for Information Literacy for Higher Education,"

Text, Association of College & Research Libraries (ACRL) (9 February 2015), <https://www.ala.org/acrl/standards/ilframework>.

28. Calarco et al., "Librarians' Competencies Profile for Scholarly Communication and Open Access."

29. NASIG Executive Board, "NASIG Core Competencies for Schol. Comm. Librarians," *NASIG Webpages* (blog, 11 August 2017), <https://www.nasig.org/Competencies-Scholarly-Communication>.

30. Australian Library and Information Association, "Foundation Knowledge for Entry-Level Library and Information Professionals," *Foundation Knowledge, Skills and Attributes Relevant to Information Professionals Working in Archives, Libraries and Records Management* (2020), <https://read.alia.org.au/foundation-knowledge-entry-level-library-and-information-professionals>.

31. Bruns, Brantley, and Duffin, "Scholarly Communication Coaching."

32. Claire Sewell, "Where Did They Come From? Educational Background of People in Scholarly Communication," *Unlocking Research* (blog, 9 March 2017), <https://unlockingresearch-blog.lib.cam.ac.uk/?p=1313>.

33. Jaya Raju, "Embracing New Trends in Scholarly Communication: From Competency Requirements in the Workplace to LIS Curriculum Presence," *Journal of Librarianship and Scholarly Communication* 7, no. 1 (19 July 2019): 13, <https://doi.org/10.7710/2162-3309.2291>.

34. Owens, "Impostor Phenomenon and Skills Confidence among Scholarly Communications Librarians in the United States."

35. NASIG Executive Board, "NASIG Core Competencies for Schol. Comm. Librarians."

36. Anna R. Craft and Samantha Harlow, "Scholarly Communications Training: Professional Development for the Next Generation of Scholars," *Serials Review* 46, no. 3 (2 July 2020): 175–83, <https://doi.org/10.1080/00987913.2020.1806651>.

37. Australian National Data Service, "23 (Research Data) Things," ANDS, <https://www.ands.org.au/working-with-data/skills/23-research-data-things> [accessed 3 August 2021].

38. University of Melbourne, "'23 Research Things—Digital Tools to Support Your Research" (2017), <https://blogs.unimelb.edu.au/23researchthings/>.

39. Matt Burton et al., "Shifting to Data Savvy: The Future of Data Science in Libraries" (2018).

40. Janice M. Jaguszewski and Karen Williams, "New Roles for New Times: Transforming Liaison Roles in Research Libraries," *New Roles for New Times* (Association of Research Libraries, 2013), <https://www.arl.org/resources/new-roles-for-new-times-transforming-liaison-roles-in-research-libraries/>.

41. Sewell, "Where Did They Come From?"

42. Claire Sewell, "Bursting the Bubble: Why It's (Not) All about the PhD in Research Support," *UKSG ENews*, no. 439 (22 February 2019), <https://hcommons.org/deposits/item/hc:25459/>.

43. Emilia C. Bell and Mary Anne Kennan, "Partnering in Knowledge Production: Roles for Librarians in the Digital Humanities," *Journal of the Australian Library and Information Association* 70, no. 2 (2021): 157–76.

44. Melanie Cheung, "RLUK Publishes Report on the Role of Research Libraries in the Production of Scholarly Research," *Research Libraries UK* (blog, 8 July 2021), <https://www.rluk.ac.uk/rluk-publishes-report-on-the-role-of-research-libraries-in-the-production-of-scholarly-research/>.

45. Christopher Hollister, "Perceptions of Scholarly Communication among Library and Information Studies Students," *Journal of Librarianship and Scholarly Communication* 5 (2017): 2, <https://doi.org/10.7710/2162-3309.2180>.

46. Jarmo Saarti, Tomi Rosti, and Helena Silvennoinen-Kuikka, "Implementing Open Science Policies into Library Processes: Case Study of the University of Eastern Finland Library," *LIBER Quarterly* 30, no. 1 (16 September 2020): 1–20, <https://doi.org/10.18352/lq.10336>.

47. Maria Bonn, Will Cross, and Josh Bolick, "Finding Our Way: A Snapshot of Scholarly Communication Practitioners' Duties and Training," *Journal of Librarianship and Scholarly Communication* 8, no. 1 (28 April 2020): eP2328, <https://doi.org/10.7710/2162-3309.2328>.

48. Owens, "Impostor Phenomenon and Skills Confidence among Scholarly Communications Librarians in the United States."

49. Owens, "Impostor Phenomenon and Skills Confidence among Scholarly Communications Librarians in the United States."

50. Owens, "Impostor Phenomenon and Skills Confidence among Scholarly Communications Librarians in the United States."

51. Owens, "Impostor Phenomenon and Skills Confidence among Scholarly Communications Librarians in the United States."

52. NASIG Executive Board, "NASIG Core Competencies for Schol. Comm. Librarians."

53. Calarco et al., "Librarians' Competencies Profile for Scholarly Communication and Open Access."

54. <https://cpas.anu.edu.au/research/research-projects/scholarly-communication-knowledge-and-skills-australasian-research>.

55. "Australian Research Data Commons," <https://ardc.edu.au/> [accessed 13 August 2021].
56. Australian Government, "MA000007: Higher Education Industry—General Staff—Award 2020," Fair Work Ombudsman (2020), https://awardviewer.fwo.gov.au/award/show/MA000007#P72_2823.
57. "Open Access Australasia," <https://oaaustralasia.org/> [accessed 13 August 2021].
58. Sewell, "Where Did They Come From?"
59. Bonn, Cross, and Bolick, "Finding Our Way."
60. Owens, "Impostor Phenomenon and Skills Confidence among Scholarly Communications Librarians in the United States."
61. Therese F. Triumph and Penny M. Beile, "The Trending Academic Library Job Market: An Analysis of Library Position Announcements from 2011 with Comparisons to 1996 and 1988," *College & Research Libraries* 25 (April 2017), <https://doi.org/10.5860/crl.76.6.716>.
62. Sewell, "Where Did They Come From?"
63. Evidence Base, "The Role of Academic and Research Libraries as Active Participants and Leaders in the Production of Scholarly Research," A Report for Research Libraries UK (June 2021), <https://www.rluk.ac.uk/rluk-publishes-report-on-the-role-of-research-libraries-in-the-production-of-scholarly-research/>.
64. Bonn, Cross, and Bolick, "Finding Our Way."
65. Owens, "Impostor Phenomenon and Skills Confidence among Scholarly Communications Librarians in the United States."
66. Owens, "Impostor Phenomenon and Skills Confidence among Scholarly Communications Librarians in the United States."
67. Rebecca Bryant, Annette Dortmund, and Brian Lavoie, "Social Interoperability in Research Support: Cross-Campus Partnerships and the University Research Enterprise" (2020), <https://doi.org/10.25333/WYRD-N586>.
68. alterline, "Supporting Academic Research: Market Study" (ExLibris, 2020), 15, <https://exlibrisgroup.com/supporting-academic-research/>.
69. Sewell, "Where Did They Come From?"
70. Bonn, Cross, and Bolick, "Finding Our Way," 8.
71. Australian Library and Information Association (ALIA), "Foundation Knowledge for Entry-Level Library and Information Professionals."
72. ALIA, "Foundation Knowledge for Entry-Level Library and Information Professionals."
73. Lisa Slingsby, "ALIA HLA Competencies," Text, ALIA Library (22 October 2019), <http://read.alia.org.au/alia-hla-competencies>.
74. Bonn, Cross, and Bolick, "Finding Our Way."
75. Bonn, Cross, and Bolick, "Finding Our Way."
76. Bridgette Comanda et al., "Service Ceiling: The High Cost of Professional Development for Academic Librarians," *In the Library with the Lead Pipe*, <https://www.inthelibrarywiththeleadpipe.org/2021/service-ceiling/> [accessed 8 July 2021]. <https://www.inthelibrarywiththeleadpipe.org/2021/service-ceiling/>.
77. Owens, "Impostor Phenomenon and Skills Confidence among Scholarly Communications Librarians in the United States."
78. Claire Sewell, "New Skills, New Challenges: CPD in the Information Profession," *New Review of Academic Librarianship* (19 April 2018), <https://doi.org/10.17863/CAM.22210>.
79. Bonn, Cross, and Bolick, "Finding Our Way."
80. Owens, "Impostor Phenomenon and Skills Confidence among Scholarly Communications Librarians in the United States."
81. Bonn, Cross, and Bolick, "Finding Our Way."

References

- alterline. 'Supporting Academic Research—Market Study'. ExLibris, 2020. <https://exlibrisgroup.com/supporting-academic-research/>.
- Association of College & Research Libraries. 'Framework for Information Literacy for Higher Education'. Text. Association of College & Research Libraries (ACRL), 9 February 2015. <https://www.ala.org/acrl/standards/ilframework>.
- Atkinson, Jeremy. 'Academic Libraries and Research Support: An Overview'. *Quality and the Academic Library*, 2016, 135–41.
- Auckland, Mary. 'Re-Skilling for Research'. RLUK Report. Research Libraries UK, 12 January 2012. <https://www.rluk.ac.uk/re-skilling-for-research/>.
- Australian Government. 'MA000007: Higher Education Industry—General Staff—Award 2020'. Fair Work Om-

- budsman, 2020. https://awardviewer.fwo.gov.au/award/show/MA000007#P72_2823.
- Australian Library and Information Association. 'Foundation Knowledge for Entry-Level Library and Information Professionals'. Foundation Knowledge, Skills and Attributes relevant to Information Professionals working in Archives, Libraries and Records Management, 2020. <https://read.alia.org.au/foundation-knowledge-entry-level-library-and-information-professionals>.
- Australian National Data Service. '23 (Research Data) Things'. ANDS. Accessed 3 August 2021. <https://www.ands.org.au/working-with-data/skills/23-research-data-things>.
- 'Australian Research Data Commons'. Accessed 13 August 2021. <https://ardc.edu.au/>.
- Bell, Emilia C., and Mary Anne Kennan. 'Partnering in Knowledge Production: Roles for Librarians in the Digital Humanities'. *Journal of the Australian Library and Information Association* 70, no. 2 (2021): 157–76.
- Bonn, Maria, Will Cross, and Josh Bolick. 'Finding Our Way: A Snapshot of Scholarly Communication Practitioners' Duties & Training'. *Journal of Librarianship and Scholarly Communication* 8, no. 1 (28 April 2020): eP2328. <https://doi.org/10.7710/2162-3309.2328>.
- Brantley, Steve, Todd A. Bruns, and Kirstin I. Duffin. 'Librarians in Transition: Scholarly Communication Support as a Developing Core Competency'. *Journal of Electronic Resources Librarianship* 29, no. 3 (2017): 137–50.
- Bruns, Todd, John Stephen Brantley, and Kirstin Duffin. 'Scholarly Communication Coaching: Liaison Librarians' Shifting Roles'. In *The 21st Century Library: Partnerships and New Roles*, 9–29. Rowman & Littlefield Publishers, 2015. https://thekeep.eiu.edu/cgi/viewcontent.cgi?referer=https://redir1&article=1100&context=lib_fac.
- Bryant, Rebecca, Annette Dortmund, and Brian Lavoie. 'Social Interoperability in Research Support: Cross-Campus Partnerships and the University Research Enterprise', 2020. <https://doi.org/10.25333/WYRD-N586>.
- Burton, Matt, Liz Lyon, Chris Erdmann, and Bonnie Tijerina. 'Shifting to Data Savvy: The Future of Data Science in Libraries', 2018.
- Calarco, Pascal, Kathleen Shearer, Birgit Schmidt, and Dominic Tate. 'Librarians' Competencies Profile for Scholarly Communication and Open Access', 2016, 6.
- Cheung, Melanie. 'RLUK Publishes Report on the Role of Research Libraries in the Production of Scholarly Research'. *Research Libraries UK* (blog), 8 July 2021. <https://www.rluk.ac.uk/rluk-publishes-report-on-the-role-of-research-libraries-in-the-production-of-scholarly-research/>.
- Comanda, Bridgette, Jaci Wilkinson, Faith Bradham, Amanda Koziura, and Maura Seale. 'Service Ceiling: The High Cost of Professional Development for Academic Librarians—In the Library with the Lead Pipe'. In *the Library with the Lead Pipe*. Accessed 8 July 2021. <https://www.inthelibrarywiththeleadpipe.org/2021/service-ceiling/>.
- Cooper, I. Diane, and Janet A. Crum. 'New Activities and Changing Roles of Health Sciences Librarians: A Systematic Review, 1990–2012'. *Journal of the Medical Library Association : JMLA* 101, no. 4 (October 2013): 268–77. <https://doi.org/10.3163/1536-5050.101.4.008>.
- Corrall, Sheila, Mary Anne Kennan, and Waseem Afzal. 'Bibliometrics and Research Data Management Service: Emerging Trends in Library Support for Research'. *Library Trends* 61, no. 3 (2013): 636–74.
- Cox, Andrew. 'Academic Librarianship as a Data Profession: The Familiar and Unfamiliar in the Data Role Spectrum'. *ELucidate* 15, no. 1–2 (2018): 49.
- Cox, Andrew M., Mary Anne Kennan, Liz Lyon, Stephen Pinfield, and Laura Sbaifi. 'Maturing Research Data Services and the Transformation of Academic Libraries'. *Journal of Documentation* 75, no. 6 (2019): 1432–62.
- Cox, Andrew, and Sabrina Petersohn. 'Competency Model for Bibliometric Work'. *The Bibliomagician* (blog), 2 October 2017. <https://thebibliomagician.wordpress.com/competencies/>.
- Craft, Anna R., and Samantha Harlow. 'Scholarly Communications Training: Professional Development for the Next Generation of Scholars'. *Serials Review* 46, no. 3 (2 July 2020): 175–83. <https://doi.org/10.1080/00987913.2020.1806651>.
- Ducas, Ada, Nicole Michaud-Ostryk, and Marie Speare. 'Reinventing Ourselves: New and Emerging Roles of Academic Librarians in Canadian Research-Intensive Universities'. *College & Research Libraries* 81, no. 1 (2020): 43.
- Evidence Base. 'The Role of Academic and Research Libraries as Active Participants and Leaders in the Production of Scholarly Research.' A Report for Research Libraries UK., June 2021. <https://www.rluk.ac.uk/rluk-publishes-report-on-the-role-of-research-libraries-in-the-production-of-scholarly-research/>.
- Federer, Lisa M., Ya-Ling Lu, and Douglas J. Joubert. 'Data Literacy Training Needs of Biomedical Researchers'. *Journal of the Medical Library Association* 104, no. 1 (January 2016): 52–57.
- Gumpenberger, Christian, Martin Wieland, and Juan Gorraiz. 'Bibliometric Practices and Activities at the University of Vienna'. *Library Management* 33, no. 3 (1 January 2012): 174–83. <https://doi.org/10.1108/01435121211217199>.
- Haddow, Gaby, and Jayshree Mamtara. 'Research Support in Australian Academic Libraries: Services, Resources, and Relationships'. *New Review of Academic Librarianship* 23, no. 2–3 (2017): 89–109.
- Haltas, N., and C. Devereux. 'Report on the Consultation Workshop Skills and Human Resources for E-Infra-

- structures within Horizon 2020.' *Undefined*, 2012. /paper/Report-on-the-Consultation-Workshop-Skills-and-for-Haltas-Devereux/bcfa2dcd24f8adf353c6f7ceb0afcff78a3fa872.
- Hey, Anthony JG, Stewart Tansley, and Kristin Michele Tolle. *The Fourth Paradigm: Data-Intensive Scientific Discovery*. Vol. 1. Microsoft research Redmond, WA, 2009.
- Hollister, Christopher. 'Perceptions of Scholarly Communication Among Library and Information Studies Students'. *Journal of Librarianship and Scholarly Communication* 5 (2017). <http://dx.doi.org.libraryproxy.griffith.edu.au/10.7710/2162-3309.2180>.
- Jaguszewski, Janice M., and Karen Williams. 'New Roles for New Times: Transforming Liaison Roles in Research Libraries'. *New Roles for New Times*. Association of Research Libraries, 2013. <https://www.arl.org/resources/new-roles-for-new-times-transforming-liaison-roles-in-research-libraries/>.
- Kennan, Mary Anne. 'Data Management: Knowledge and Skills Required in Research, Scientific and Technical Organisations', 10, 2016.
- Ketchum, Andrea M. 'The Research Life Cycle and the Health Sciences Librarian: Responding to Change in Scholarly Communication'. *Journal of the Medical Library Association: JMLA* 105, no. 1 (2017): 80.
- Klain-Gabbay, Liat, and Snunith Shoham. 'Scholarly Communication and Academic Librarians'. *Library & Information Science Research* 38, no. 2 (2016): 170–79.
- Koltay, Tibor. 'Data Literacy for Researchers and Data Librarians'. *Journal of Librarianship and Information Science* 49, no. 1 (1 March 2017): 3–14. <https://doi.org/10.1177/0961000615616450>.
- Kramer, Bianca, and Jeroen Bosman. 'Innovations in Scholarly Communication—Global Survey on Research Tool Usage'. *F1000Research* 5 (18 April 2016). <https://doi.org/10.12688/f1000research.8414.1>.
- Maron, Nancy, Rebecca Kennison, Paul Bracke, Nathan Hall, Isaac Gilman, Kara Malenfant, Charlotte Roh, and Yasmeen Shorish. 'Association of College and Research Libraries. Open and Equitable Scholarly Communications: Creating a More Inclusive Future'. Chicago: Association of College and Research Libraries, 2019. <https://doi.org/10.5860/acrl.1>.
- NASIG Executive Board. 'NASIG Core Competencies for Schol. Comm. Librarians'. *NASIG Webpages* (blog), 11 August 2017. <https://www.nasig.org/Competencies-Scholarly-Communication>.
- — —. 'NASIG Core Competencies for Schol. Comm. Librarians'. *NASIG Webpages* (blog), 11 August 2017. <https://www.nasig.org/Competencies-Scholarly-Communication>.
- 'Open Access Australasia'. Accessed 13 August 2021. <https://oaaaustralasia.org/>.
- Owens, Erin. 'Impostor Phenomenon and Skills Confidence among Scholarly Communications Librarians in the United States'. *College & Research Libraries* 82, no. 4 (2021): 490. <https://doi.org/10.5860/crl.82.4.490>.
- Raju, Jaya. 'Embracing New Trends in Scholarly Communication: From Competency Requirements in the Workplace to LIS Curriculum Presence'. *Journal of Librarianship and Scholarly Communication* 7, no. 1 (19 July 2019). <https://doi.org/10.7710/2162-3309.2291>.
- Saarti, Jarmo, Tomi Rosti, and Helena Silvennoinen-Kuikka. 'Implementing Open Science Policies into Library Processes—Case Study of the University of Eastern Finland Library'. *LIBER Quarterly* 30, no. 1 (16 September 2020): 1–20. <https://doi.org/10.18352/lq.10336>.
- Sandy, Heather Moulaison, Anthony J. Million, and Cynthia Hudson-Vitale. 'Innovating Support for Research: The Coalescence of Scholarly Communication?' *College & Research Libraries* 81, no. 2 (2020): 193.
- Saunders, Laura. 'Core Knowledge and Specialized Skills in Academic Libraries'. *College & Research Libraries* 81, no. 2 (2020): 288.
- Schmidt, Birgit, and Kathleen Shearer. 'Librarians' Competencies Profile for Research Data Management', June 2016. https://www.coar-repositories.org/files/Competencies-for-RDM_June-2016.pdf.
- Sewell, Claire. 'Bursting the Bubble: Why It's (Not) All about the PhD in Research Support'. *UKSG ENews*, no. 439 (22 February 2019). <https://hcommons.org/deposits/item/hc:25459/>.
- — —. 'New Skills, New Challenges: CPD in the Information Profession'. *New Review of Academic Librarianship*, 19 April 2018. <https://doi.org/10.17863/CAM.22210>.
- — —. 'Where Did They Come from? Educational Background of People in Scholarly Communication'. *Unlocking Research* (blog), 9 March 2017. <https://unlockingresearch-blog.lib.cam.ac.uk/?p=1313>.
- Slingsby, Lisa. 'ALIA HLA Competencies'. Text. ALIA Library, 22 October 2019. <http://read.alia.org.au/alia-hla-competencies>.
- Tran, Ngoc-Yen, and Emily K. Chan. 'Supporting Scholarly Research: Current and New Opportunities for Academic Libraries', 2020.
- Triumph, Therese F., and Penny M. Beile. 'The Trending Academic Library Job Market: An Analysis of Library Position Announcements from 2011 with Comparisons to 1996 and 1988 | Triumph | College & Research Libraries', 25 April 2017. <https://doi.org/10.5860/crl.76.6.716>.
- University of Melbourne. '23 Research Things—Digital Tools to Support Your Research', 2017. <https://blogs>.

unimelb.edu.au/23researchthings/.

Vanhaverbeke, Hannelore, Barbara Lancho Barrantes, and Andrew Cox. “Don’t Stop Thinking about Tomorrow!” —Future Competencies in Bibliometrics’. *The Bibliomagician* (blog), 15 March 2021. <https://thebibliomagician.wordpress.com/2021/03/15/future-competencies-in-bibliometrics/>.

Wolski, M., Louise Howard, and J. Richardson. ‘The Importance of Tools in the Data Lifecycle’. *Digital Library Perspectives*, 2017. <https://doi.org/10.1108/DLP-11-2016-0042>.