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Embracing New Trends in Scholarly Communication: From Competency Requirements in the Workplace to LIS Curriculum Presence

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INTRODUCTION Scholarly communication has undergone dramatic change in the digital era as a result of rapidly evolving digital technology. It is within this context of evolving scholarly communication that this paper reports on an inquiry into (1) the extent to which university libraries in South Africa are actively embracing new and emerging trends in scholarly communication; and (2), the extent to which LIS school curricula in South Africa are responding to new and emerging scholarly communication competencies required in university libraries. **METHODS** This qualitative study, located within an interpretivist epistemological worldview, was informed by the Operational Elements of Scientific Communication aspect of Khosrowjerdi's (2011) Viable Scientific Communication Model. Data was collected using summative content analysis of university library job advertisements over a four-year period; South African university libraries' organizational organograms; and course descriptions available on the websites of South Africa's LIS schools. **RESULTS & DISCUSSION** A review of job advertisements and organograms shows that on the whole university libraries in South Africa are embracing the new and emerging trends in scholarly communication, but some university libraries are performing better than others in adopting emerging scholarly communication services such as RDM, digital humanities, or research landscape analysis. Course description analysis provides evidence that LIS schools' curricula, as per global trend reported in the literature, do not seem to be keeping pace with developments in scholarly communication. **CONCLUSION** The ambivalent nature of an evolving scholarly communications field with unclear definitions and boundaries necessitates professional practitioners who are adaptable and open to change as well as an LIS education curriculum that is in constant review to seamlessly embrace an evolving field propelled by advancing digital technologies.

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IMPLICATIONS FOR PRACTICE

1. LIS schools (in South Africa and elsewhere) need to do more to respond to emerging scholarly communication competencies required in the professional workplace.
2. University libraries need to respond to this skills gap by using continuous professional development opportunities to redefine existing positions and reskill for new roles in order to address scholarly communication core competencies.
3. Those university libraries with challenges in adopting emerging scholarly communication services need to adopt creative strategies to address these challenges in an age where scholarly communication has proliferated in academic library services.

“It is one of the noblest duties of a university to advance knowledge, and to diffuse it not merely among those who can attend the daily lectures—but far and wide.”
-Daniel Coit Gilman, first president of John Hopkins University who said this of its university press, founded in 1878

INTRODUCTION

Scholarly communication refers to methods and practices in the creation, evaluation for quality, dissemination to the scholarly community, and preservation for future use of research writings and other scholarly output (Association of College & Research Libraries, 2003). The digital era has witnessed a sea change in scholarly communication activities, in both the developed and the developing world, such as on the African continent. Scholarly communication now includes not just formal means such as publication in peer-reviewed journals, but also informal means such as electronic listservs and social media blogs, wikis, and tweets (Calarco, Shearer, Schmidt, & Tate, 2016). South Africa and the African continent are no exception to this global trend. Traditional subscription-based publishing models are now supplemented by open access (OA) “publishing practices and tools to facilitate greater reach and impact of scholarly research” (Burpee & Fernandez, 2014, p. 2). As with universities across the globe, universities in South Africa too “seek to reap the benefits of OA” (Raju, Raju, & Johnson, 2016, p. 168). As part of the open access movement, institutional repositories the world over have become common features of higher education institutions for purposes of both preservation and dissemination of institutions’ knowledge output. For example, OpenDOAR (Directory of Open Access Repositories) (2019) reports a sharp rise, particularly in the last five years, in the growth in the number of institutional repositories on the African continent. Digital repositories, open access books and journals, and open access educational resources are all affected by copyright issues. This makes author rights management and advocacy a

critical component of the digital scholarly communication landscape in both the Global North and Global South (including South Africa and the African continent), in addressing challenges relating to author rights management. As a natural complement to open access, curation/management of research data too entered the rapidly transforming scholarly communication terrain, and, as described in a South African competency index for academic libraries, involves managing data from its creation and subsequent period of usefulness to science/inquiry through to its preservation for posterity or until it becomes obsolete (Raju, 2017, p. 16).

Computing capabilities have also opened up new areas of scholarly communication, such as digital humanities (the “application of digital resources and methods to humanistic enquiry”) and e-science resulting from the application of “high-performance computing, visualization and the manipulation of large datasets” (Cox, 2016, p. 132). South African university libraries have spontaneously integrated digital humanities into services for their academic and research communities, with conferences and regular workshops and webinars held across the country to support an emerging academic library service in the area of digital humanities and e-research. The application of digital capabilities to traditional methods of research scholarship has also accentuated research impact metrics/assessment as a scholarly communication activity. Raju and Raju (2017, pp. 61–62) report research impact measurement and assessment as an emerging service in academic libraries on the African continent, but especially in South Africa. The scholarly communication landscape, propelled by rapidly evolving digital or computer technology, has altered dramatically and continues to change at an increasingly fast pace (Thomas, 2013, p. 170). Library involvement in these scholarly communication activities, particularly of academic libraries, because of their critical role in higher education knowledge production, “has the potential to positively impact the global dissemination, discovery, and development of scholarship” (Fruin, 2017, p. 2), in both the developed and developing world, such as on the African continent, which is the site (South Africa) of the study being reported in this paper.

Research Questions and Purpose

It is within this context of evolving scholarly communication across the globe that this paper reports on the use of the Operational Elements aspect of the Viable Scientific Communication Model (Khosrowjerdi, 2011) to inform an inquiry guided by the following research questions: (1) To what extent are university libraries in South Africa actively embracing new and emerging trends in scholarly communication, and (2) To what extent are LIS school curricula in South Africa responding to new and emerging scholarly communication competencies required in university libraries?

Theoretical Support

Many models on scholarly communication have been developed over the years, each focusing on a different approach. For example, Shearer and Birdsall (2002) designed a scholarly communication model specifically for the national context of Canada, which focused on teaching, making knowledge available to the public, and stimulating new research to create new knowledge. Garvey and Griffith’s (1972) model reflects a scholarly communication process at a time when IT support was largely absent. Khosrowjerdi (2011, p. 359) developed the Viable Scientific Communication Model (VSCM) after drawing from Beer’s (1985) Viable System Model (VSM) designed as a “tool for anticipating, planning for, and implementing large scale development in [the] scientific communication domain.” Khosrowjerdi (2011, p. 359) explains that compared to earlier models on scholarly communication, the VSCM “is not dependent on context, time, and scale. . . . This model is a viable model which can update itself over years.” Hence the appeal of the VSCM to inform this inquiry, especially in a context of evolving scholarly communication, largely driven by rapidly advancing digital technologies. For the purposes of the inquiry being reported in this paper, an aspect of the VSCM (Khosrowjerdi 2011) called the Operational Elements of Scientific Communication was used (see Figure 1).

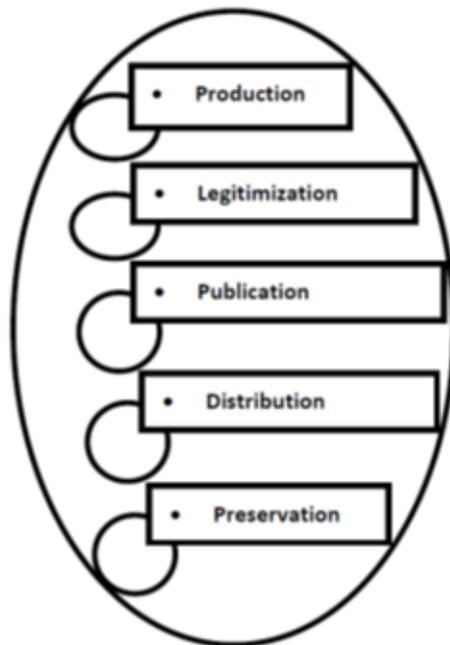


Figure 1. Operational Elements of Scientific Communication (Khosrowjerdi 2011)

The five elements reflected in Figure 1 from the VSCM correlate well with the ACRL's (2003) definition of scholarly communication with which this paper opened and which to this day remains highly cited in Library and Information Services/Science (LIS) literature. Nentwich (2004) used these operational elements in an inquiry into the future of quality control in an academic publication system using electronic publishing; and Borgman (2007) used them in her exploration of the technical, social, legal, and economic features of scholarly infrastructure required to support research activities in various disciplinary domains. Similarly, this study used the following five elements from the VSCM (Khosrowjerdi 2011) to ascertain the extent to which university libraries in South Africa are actively embracing new and emerging trends in scholarly communication, and in tandem, the extent to which LIS school curricula in South Africa are responding to new and emerging scholarly communication competencies required in university libraries:

- Content production: critical thinking and generation of ideas, producing research that results in written or other output (e.g., journal articles);
- Content legitimization: scholarly communities do not trust produced content until it is validated in some way (e.g., a peer-review process). The peer-review process is an excellent example of content legitimization and results in content being evaluated for improvement, publishing, or rejection;
- Content publication: Content publication may be in hard form (physically available) and/or digital form (virtually accessible from almost anywhere);
- Content distribution: content will not be used unless it is accessed. Content distribution has been revolutionized by the Internet and its various applications, including Web 2.0 interactive capabilities; and
- Content preservation: the produced and distributed content is, in this final stage of the scholarly communication process, preserved in library or archival collections, in digital repositories or databases, and in other content-preservation spaces for future use.

In addressing the research questions guiding the inquiry, these five elements of scientific communication were used to inform the data collection (see Methodology section). Khosrowjerdi's (2011, n.p.) VSCM is cognizant of the "future environment":

In recent years, technology advancement such as digitization has revolutionized the scholarly communication system . . . : open access initiatives, blogs, social bookmarking, social networking, podcasts, wikis, and professional and academic hubs. These advancements are extraordinarily increasing in recent

years and will be raised wildly in the future. . . .Web 2.0 technology . . . offers tremendous potential to enhance scholarly communication.

LITERATURE REVIEW

The literature related to this study’s research questions reflects certain common themes, which will be categorized here.

Scholarly Communication Services in Academic Libraries

A core of four or five mainly new or emerging academic library services related to scholarly communication abound in the literature. Calarco et al. (2016, n.p.) identify these as the following:

1. Scholarly publishing services (VSCM’s *content publication*): providing publishing services using digital publishing platforms for journals, books, conference proceedings, working papers, and “other works of original scholarship from faculty and students”; collaborating with digital repository, IT, and other relevant professionals “to provide for storage, description, access and preservation of this content” (VSCM’s *content distribution* and *content preservation*).
2. Open access repository services (VSCM’s *content distribution* and *content preservation*): collecting, managing and disseminating scholarly output by the institution and its scholarly community.
3. Copyright and open access advice (VSCM’s *content publication*): providing education and advice to academics, researchers, and postgraduate students “on copyright and open access policies, services and resources, as well as open access licenses and publishing alternatives.”
4. Assessment of scholarly resources (VSCM’s *content legitimization*): providing expertise and consultation to the institution’s scholarly community on scholarly resource assessment and metrics, which includes both traditional bibliometrics (citation analysis) as well as altmetrics (social media and other online media analysis).

The North American Serials Interest Group (NASIG: Transforming the Information Community, 2017, pp. 4–6) identifies the same four services, albeit with slightly different wording, but in addition it identifies a further scholarly communication service:

5. Research data management services (VSCM’s *content distribution* and *content preservation*): collaborating with researchers, technical services librarians, and

the institution's IT professionals “to develop and apply metadata schemata to researcher-generated data sets and collaborate on the development of technical solutions to preserve and share data sets”; working with institutional research offices, academics, researchers and postgraduate students to advise on research data management (RDM) planning for grant applications and other purposes, using tools such as the DMPTool, RDMRose, or other available RDM tools.

Many studies (Fruin, 2017; Holister, 2017; Finlay, Tsou, & Sugimoto, 2015; Burpee & Fernandez, 2014; Thomas, 2013; Radom, Feltner-Reichert, & Stringer-Stanback, 2012) reiterate some or all of these activities as existing or emerging scholarly communication services in university libraries around the world. Thomas (2013, p. 167), researching in the North American context, indicates that “many libraries are already working with electronic theses and dissertations (ETDs) and running institutional repositories (IRs), and many others are considering further options such as administering open access journals. Thomas’s (2013, p. 169) study also revealed that a growing number of university libraries “administer an OA [open access] publishing fund” to support authors with the fee payable when publishing open access. Burpee and Fernandez (2014, p. 4), in their Canadian study, explain that many library scholarly communication activities, such as IRs, publishing, and copyright/author rights advocacy, “are related to general support for OA. OA has received universal support among academic libraries worldwide.” In her environmental scan of United Kingdom (UK) research libraries, Fruin (2017, p. 10) found that the majority of respondents identified assisting authors to “increase discoverability and impact of their scholarship” as the “greatest benefit” of the library’s provision of scholarly communication services. A further benefit cited was the promotion of “compliance with and interpretation of [funders’] open access mandates.” The Association of Research Libraries (ARL) *SPEC Kit 332* survey (Radom, Feltner-Reichert, & Stringer-Stanback, 2012, p. 18), which explored how research institutions in the United States are organizing staff to support scholarly communication services, found that “libraries are leaders in organizing scholarly communication efforts at their institutions.” However, championing library scholarly communication services is not without its challenges, as noted by Cox (2016, p. 134): open access and research data management are “hard to sell to academics.” Significant levels of disinterest and scepticism about open access still exists among researchers, and there are still researchers who have negative attitudes about data sharing. While some studies focus on research support services, for example the Australian study by Keller (2015: 75), the services focused on, “institutional repositories, open access, bibliometrics . . . research impact, . . . [and] research data management,” are essentially scholarly communication services identified as such in the literature, thus portraying research support services as being synonymous with scholarly communication services.

Job Titles Related to Scholarly Communication

Table 1 captures job titles from the literature (Calarco et al., 2016; Cox, 2016, p. 138; Finlay, Tsou, & Sugimoto, 2015, p. 14; Keller, 2015, p. 81; Bonn, 2014, p. 1) categorized in terms of the five core academic library scholarly communication services identified from the literature (see previous section).

Scholarly communication service	Scholarly communication job titles	VSCM operational element of scientific communication
Scholarly publishing services	Scholarly Communication Librarian; Scholarly Publications Librarian; Electronic Acquisitions & Serials Librarian; Metadata & Scholarly Publishing Librarian	Content publication
Open access repository services	Institutional Repository Librarian; Digital Repository Librarian; Digital Scholarship Services Librarian; Research Services Librarian; Digital Collections Specialist	Content distribution Content preservation
Copyright and open access advice	Scholarly Communication Librarian; Copyright Librarian	Content publication
Assessment of scholarly resources	Assessment Librarian; Scholarly Communication Librarian; Research Support Librarian	Content legitimization
Research data management services	Research/Scholarship Initiatives Librarian; Research Data Management & eScholarship Specialist; Digital Humanities Librarian	Content distribution Content preservation

Table 1. Scholarly communication job titles

Thomas (2013, p. 1), in reviewing the ARL’s *SPEC Kit 332* survey of American research libraries, observes that many librarians leading scholarly communication have the term *scholarly communication* in their job titles; many of them “devote half their time or less to scholarly communication duties”; and, in some instances, scholarly communication is led by a group with members coming from “a variety of departments across the library” (Thomas, 2013, p. 1). Thomas also observed from this survey that job titles related to scholarly communication included terms such as *digital initiatives/services/curation* and *copyright*. To this list, Finlay, Tsou, and Sugimoto (2015, p. 15) add the terms *research* and *publishing*. From their analysis of 232 job advertisements (2006–2014) that focused specifically on scholarly communication activities, they also observed a fairly even distribution “between core scholarly communication positions and jobs for which scholarly communication was only a part.”

Fruin's (2017, p. 8) study found that in contrast to the American scenario, in the United Kingdom, research libraries' delivery of scholarly communication services "was either provided by teams composed of several librarians. . . or by a cross-institution committee or group composed of librarians and representatives from institutional offices of research and computing." Fruin (2017, p. 16) cites the advantage of the UK "large team" approach to coordinating and collaborating in the delivery of scholarly communication services" as that it not only facilitates the "workflow and other efficiencies related to library publishing, institutional repository management, and open access advocacy," but also that it "increases the visibility of a library's scholarly communication program to the larger university community." Cox (2016, p. 138) provides examples of nomenclature of such teams: "Scholarly Communications Team," "Open Access and Data Curation Team," and even a "Center for Digital Scholarship," which is a "cross-departmental team, led by a Digital Scholarship Services Manager and incorporating posts such as a Scientific Data Management Specialist, Manager of Imaging and Metadata Services and Data Visualization Coordinator."

The Results and Discussion sections of this paper present the extent to which the South African situation aligns or differs from these global exemplars in terms of job titles and form of scholarly communication service delivery.

Scholarly Communication Roles and Responsibilities

Table 2 summarizes the academic library's scholarly communication roles and responsibilities as reflected in the literature (NASIG: Transforming the Information Community, 2017, pp. 4–7; Calarco et al., 2016; Klain-Gabbay & Shoham, 2016, p. 172; Myers, 2016, pp. 17–18; Finlay, Tsou, & Sugimoto, 2015, pp. 5–6; Xia & Li, 2015, pp. 18–20; Bonn, 2014, pp. 1–2; Burpee & Fernandez, 2014, pp. 3–4; Steele, 2014, p. 251; Malenfant, 2010, p. 69).

Data from Finlay, Tsou and Sugimoto's study (2015, pp. 20–21) suggests that as academic libraries continue to embark on scholarly communication services, "the trend of adding scholarly communication responsibilities to existing job responsibilities is likely to continue barring increases in library budgets to accommodate new hires." They go on to explain that various positions in the library are therefore likely to include scholarly communication roles and responsibilities. However, they caution that this "may also demonstrate a problem of a lack of clear definitions and boundaries for scholarly communication librarians" and they therefore join the call for "appropriate and formalized job descriptions." Cox (2016, p. 133) too makes reference to this "multi-stranded" nature of library roles that "enable digital scholarship," emphasizing that scholarly communication for academic libraries is "experimental" and "indicative of a rapidly evolving field without clear boundaries," and that identifying a clear library service offering in this area is, not surprisingly, difficult.

Scholarly communication service	Scholarly communication roles and responsibilities	VSCM operational element of scientific communication
Scholarly publishing services	Undertake OA journal, book and other publishing for to the institution’s scholarly community	Content publication
Open access repository services	Manage and market an institutional repository to provide open access to journal articles and other research output by the institution’s scholars; Engage in OA scholarship advocacy on and off campus to promote access to knowledge; Work with relevant library departments to develop and maintain an APC fund, library’s membership of OA initiatives and OA clauses in licenses	Content distribution Content preservation
Copyright and open access advice	Provide outreach, consultation and guidance on copyright, author rights and publishing agreements; OA options; and, funder mandates to the institution’s scholarly community	Content publication
Assessment of scholarly resources	Provide institution’s scholars with services and resources to help assess quality and impact of scholarship using traditional bibliometrics, webmetrics and emerging altmetrics	Content legitimization
Research data management services	Manage metadata application to research generated data sets; Collaborate with researchers, IT professionals and other relevant stakeholders toward the development of technical solutions to preserve and share data sets; Work with the institutional research office and other relevant stakeholders to advise researchers on RDM, including the drawing up of data management plans (DMPs)	Content distribution Content preservation

Table 2. Scholarly communication roles and responsibilities

Scholarly Communication Knowledge, Skills, and Other Competencies

Table 3 provides an overview of scholarly communication knowledge, skills, and other competency requirements drawn largely from an existing scholarly communication competency profile by Calarco et al. (2016), with additional support from other literature (Gbaje, Yani & Odigie, 2018, p. 14; Raju, 2017, pp. 15–16; NASIG: Transforming the Information Community, 2017, pp. 8–9; Malenfant, 2010, pp. 68–69).

Scholarly communication service	Knowledge	Skills	Other competencies	VSCM operational element of scientific communication
Scholarly publishing services	Commercial/traditional and OA publishing platforms; Publishing workflows, operational models and editorial processes; Publishing standards (DOIs, ISBNs, ISSNs, ORCiDs, Handles, etc.); Funder mandates and requirements; Metadata standards (MARC, Dublin Core, etc.) and discovery tools; Current trends and issues in open access and scholarly communication, both formal (peer-review process) and informal electronic listservs, social media blogs, tweets, etc.); Data curation and preservation best practices; Licensing issues relating to OA (Creative Commons, etc.)	Use OA publishing software (OJS, OMP, etc.); Work with institutional IT professionals to develop capacity and IT infrastructure for storage, metadata management, access and long-term preservation of published content	Collaborative and team building skills; Communication skills	Content publication
Open access repository services	Open access policies and requirements; Repository software, metadata standards, and discovery tools; Data formats, database design, data management, and data manipulation tools; Current trends and issues in open access and scholarly communication, both formal (peer-review process) and informal electronic listservs, social media blogs, tweets, etc.); Copyright and licensing issues relating to scholarly content; Data curation and preservation best practices	Manage repository platform and update software as required; Support researchers with depositing research output into the repository/self-archiving; Engage publishers on matters relating to archiving policies (embargo periods, article processing charges, etc.)	Communication skills; Advocacy skills	Content distribution; Content preservation
Copyright and open access advice	Copyright and licensing issues relating to scholarly content (traditional copyright, Creative Commons, other OA licenses); OA policies, funder mandates and their requirements; Current trends and issues on open access and scholarly communication, both formal (peer-review process) and informal electronic listservs, social media blogs, tweets, etc.); Traditional scholarly publishing system	Raise awareness of OA, including issues on OA policy adherence, funder mandate requirements, APCs, and benefits to end-users; Provide advice to authors on alternatives to transferring copyright of their intellectual output when publishing scholarly content	Outreach and education skills; Communication skills	Content publication
Assessment of scholarly resources	Assessment criteria of journals and other scholarly resources; Theory and practice of bibliometrics/webmetrics, altmetrics and qualitative assessment of scholarly content (e.g. peer review); Institutional promotion policies and procedures for academics based on their scholarly output; Institutional interests in scholarly output as this pertains to institutional ranking	Provide support to academics, researchers and graduate students in assessing quality of journals and other scholarly resources for publication and other purposes; Advise library's acquisitions department on quality indicators for selection of scholarly resources	Assessment skills	Content legitimization
Research data management services	Metadata standards applicable to research generated data sets; Data management planning (DMP) tools (DMPTool, RDM-Rose, etc.); Funder mandate requirements relating to data storage, access and retention; Data repository solutions, including capabilities of institutional repositories for supporting data management (DSpace, Digital Commons, Fedora, etc.), general data-specific repositories (Figshare, Dryad, etc.), and available subject specific data repositories	Collaborate with researchers, IT professionals and other relevant stakeholders on metadata application to research generated data sets and on technical solutions to preserve and share data sets; Provide advice to researchers on research data management, including the drawing up of data management plans; Apply funder mandates relating to data storage, access and retention	Collaborative skills; Outreach and education skills	Content distribution; Content preservation

Table 3. Scholarly communication knowledge, skills and other competency requirements

Scholarly Communication and LIS Education

While academic libraries are assigning scholarly communication roles and responsibilities to job descriptions, “library schools seem not to be undertaking analogous curricula changes” (Fruin, 2017, p. 5). Respondents in Fruin’s survey of UK research libraries indicated that traditional LIS education was “insufficient” (p. 5) for academic librarians undertaking scholarly communication activities. Raju, Raju, and Johnson (2016, p. 176), writing about research support in the South African academic library context, claim that “services such as RDM and bibliometrics are hamstrung by the lack of skills capacity which is exacerbated by the general sluggishness among LIS schools to take up the challenge in this new skills area.” Hollister’s (2017, pp. 9–10) review of “course catalogs for all ALA-accredited degree programs” revealed that courses at just a handful of institutions were “devoted entirely to SC and named accordingly.” However, each of these courses was offered as an elective and offered only intermittently. Other “program catalogs” included courses with topics such as intellectual property, publishing, or digital preservation, or “focused on academic librarianship that included SC modules.” In summary, Hollister’s (2017, p. 10) study found that only about 15% of the “59 ALA-credited programs appeared to include SC courses at the time of this research.” Bonn (2014, p. 3) too “calls for expansion of education and training to attend to the current climate and the needs of the academic community,” while Finlay and Bull (2017, p. 17) claim that “library schools [should] adjust their curricula to reflect present demands of the job market.”

Gbaje, Yani, and Odigie (2018, p. 2) sought to identify knowledge and skills gaps among academic librarians in Nigeria “with a view to making appropriate recommendations to fill the gaps”; otherwise these librarians “will be unable to support scholars in the emerging scholarly communication process.” They too, as expressed in the developed world studies cited earlier, argue that scholarly communication responsibilities “are not the conventional competencies and skills acquired from the library schools.” The Australian expressed similar laments: despite “increasing demand for services in the area of research impact . . . the required skills are not (yet) part of the regular library school curriculum” (Keller, 2015, p. 77). Carpenter, Graybill, Offord, and Piorun (2011, n.p.) adopted a scenarios methodology to investigate the library’s role in scholarly communication in the year 2025. They learned from library director respondents that in view of the new set of skills required for librarians to be effective in “advocating for changes in the scholarly communication process and to assume new roles, LIS schools should “assume a leadership role” in the education and training of LIS professionals in “newly identified skills (data management, curation and preservation, . . . knowledge of the publishing industry).”

The literature offers 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.

METHODS

For empirical support of this qualitative inquiry located within an interpretivist epistemological worldview, summative content analysis (Nuendorf, 2017; Profile Tree, 2017) of the following were employed: Job advertisements of South African university libraries for January 2015 through September 2018 (at time of study – just under four years); organizational organograms of South African university libraries; and course descriptions of South Africa’s LIS schools available via their websites. The inquiry was informed by the Operational Elements of Scientific Communication aspect of the VSCM (Khosrowjerdi 2011), and a review of relevant literature. Such an inquiry is deemed critical for appropriate practice (LIS services and education) as well as research contributing to the evolving nature of the LIS discipline.

With the content analysis research method, qualitative data may be converted into quantitative figures for purposes of making effective interpretations through reading and coding the qualitative data (Nuendorf, 2017; Profile Tree, 2017). That is, texts are assigned codes to identify important patterns. Summative content analysis “involves counting and comparisons, usually of keywords or content, followed by the interpretation of the underlying context” (Profile Tree, 2017). The counting of occurrences of examined words can be done either by hand or by computer. In this study, because of the relatively small data set size, the counting was done by hand, and was preferred by the researcher as it allowed for identification and sorting of finer nuances in the data that is not possible with machine processing. The assigning of codes was not necessary, as the researcher focused on explicit or implicit presence in the text of the term *scholarly communication*. By calculating the frequency of the presence of this and related terms, the researcher was able to ascertain the extent to which scholarly communication is being embraced in the particular context (that is, academic libraries in the case of job advertisements and organograms, and LIS education in the case of course descriptions from the websites of LIS schools).

Content Analysis of Job Advertisements

While content analysis of job advertisements is an established research method for ascertaining employers’ competency expectations and has been well used in LIS research (Finlay, Tsou, & Sugimoto, 2015, p. 6), it is, however, not without its limitations. For

example, while job advertisements may reflect what employers want, realistically they may not necessarily reflect what employers are able to hire. Further, job advertisements may not necessarily accurately reflect the state of expertise in a particular field. In addition, the compilers of job advertisements (representing employers) might not have performed an adequate task of carefully thinking through the requirements of the job. Notwithstanding these weaknesses, in the case of this study, job advertisements nevertheless, provide a useful lens with which to seek out the prevalence of scholarly communication in job advertisements and hence ascertain the extent to which scholarly communication has been embraced in university libraries in South Africa. One hopes that the number of advertisements analyzed in this study (almost 200), despite the limitations identified above, does reveal useful trends about the presence of scholarly communication in the university library workplace in South Africa. For reasons of currency, job advertisements from South African public university libraries for the past almost four years (January 2015–September 2018) were analyzed (in September 2018). These were consistently sought from the weekly newspaper *Mail & Guardian*, a respected source of higher- education job advertisements in South Africa, as well as from LiasaOnline, an electronic distribution list of the LIS professional body, Library and Information Association of South Africa (LIASA) and which is a reliable source of LIS advertisements in South Africa. A total of 196 advertisements were analyzed, and this figure excluded duplicate advertisements as well as readvertisements. The job title, requirements, and duties/responsibilities in the advertisements were reviewed for explicit or implicit indications of scholarly communication services/activities, and these were captured in a table (see Table 4) organized according to the five core academic library scholarly communication services gleaned from the literature and correlated to the operational elements of scientific communication of the VSCM (Khosrowjerdi 2011). Repetitions of the same scholarly community service or activity within an advertisement were only counted once. The review of job advertisements did not focus only on advertisements specifically for scholarly communication positions, but included all academic library professional positions (that is, those requiring a professional LIS qualification), as it is clear from the literature that “different positions in the library are likely to include scholarly communication components”; and, as already alluded to in the literature review section of this paper, this may be an indication of an inherent “lack of clear definitions and boundaries for scholarly communication librarians” (Finlay, Tsou, and Sugimoto, 2015, p. 21). This is not unusual for a rapidly evolving and emerging field such as scholarly communication.

Content Analysis of University Library Organograms

Organograms of 24 out of 26 South African university libraries (two did not respond)

were reviewed using summative content analysis, for explicit mention of the term *scholarly communication* in the organograms or even implicitly via terminology related to scholarly communication. An organogram is an organizational chart of the structure of an organization, illustrating the relationship among departments, senior positions and subordinate positions (Org Chart, 2017). Hence, this is an appropriate tool to ascertain the extent to which individual university libraries have embraced scholarly communication through a reflection on relevant nomenclature in its organizational chart. Here too, for the quantitative content analysis, a table (see Table 5) was structured according to the five core academic library scholarly communication services identified in the literature and mapped to the operational elements of scientific communication of the VSCM (Khosrowjerdi, 2011).

Content Analysis of LIS Schools' Course Descriptions

Course information was sourced for seven of the eight LIS schools in South Africa based at the Universities of Cape Town, Fort Hare, KwaZulu-Natal, Limpopo, Pretoria, South Africa, Western Cape, and Zululand, via course descriptions found on their websites (see Appendix A for links to schools' websites from which course descriptions were accessed). The author's experience as an LIS education researcher in South Africa for almost 20 years allowed her to identify this source (despite limitations such as currency and extent of detail) as being at least a common (among the seven schools) indicator of curriculum trends. South African higher-education role-players, like their counterparts in other parts of the world, have become acutely aware of the power of social media (including website postings) for marketing and general visibility purposes. Hence all seven of these schools had course descriptions on their websites, albeit in differing formats, states of currency, and extent of detail. Interviews probing the inclusion of scholarly communication in the curriculum would have extracted very generic responses (revealed from past research experience in curriculum related areas) and requests from LIS schools for course outlines and descriptions are usually met with a referral to the department website. Further, in times of financial austerity especially in developing contexts, e-copies of course descriptions available via websites are deemed more economical than generating print copies for distribution. It is in this context that this study selected course descriptions posted on the seven LIS schools' websites as a relevant site for data collection. The eighth school was not included in the study, as the author's participation in the South African Heads of LIS Schools' Forum since its inception in 2015 revealed it to be an inactive LIS school with no representation in the Forum due to restructuring at its university leading to the demise of LIS as an academic discipline at the university.

In this instance of data collection too, explicit or implicit indications of scholarly communication were captured in a table (see Table 6) organized according to the five core academic library scholarly communication services gleaned from the literature and mapped to the operational elements of scientific communication of the VSCM (Khosrowjerdi 2011). Again, the author would like to reiterate that as a researcher she was very aware that course descriptions in website postings might not reveal embedded curriculum content on scholarly communication. It was for this reason that, as with the job advertisements and university library organograms, as well as with the course descriptions on websites, summative content analysis and subsequent counting of content occurrences were done by hand by the researcher herself (rather than using data analysis software). The researcher's years of experience of academic libraries both as a professional practitioner and as a researcher ensured that the finer nuances of the data, such as implicit inclusion of scholarly communication, could be captured.

RESULTS

Despite the intention to capture data in Table 4 according to the five core academic library scholarly communication services gleaned from the literature, it became necessary to add two additional rows (differentiated in blue shading) to allow for the capturing of data relating to research support in general and digital library services contributing to scholarly communication (both very common in the advertisements reviewed but not an exact fit for the five core scholarly communication services gleaned from the literature, which are more specific). Once again, this is perhaps an indication of an evolving field with still unclear definitions and boundaries, as alluded to earlier. For consistency and purposes of comparison, these two additional rows were also added for Table 5 (content analysis of organograms) and Table 6 (content analysis of course descriptions). In Tables 4, 5, and 6, as per acceptable research practice, it was not deemed necessary to show percentages for small numbers; the frequency counts themselves reveal a meaningful pattern. For this reason as well, in Tables 5 and 6, which carry much smaller data sets compared to Table 4, the fourth column designated for percentages is left blank (over and above the fact that the calculation of percentage distributions in the latter two tables is obviated by the lack of a uniform or meaningful base number for such a calculation due to the nature of the data source).

Scholarly communication service	Scholarly communication activity	Frequency of occurrence	% of total number of advertisements (n = 196)	VSCM operational element of scientific communication
Scholarly publishing services	scholarly publishing	4		Content publication
	hosting open access journals	3		
Sub-total		7	3.5%	
Open access repository services	repository platform mngt/admin	20		Content distribution; Content preservation
	discoverability services	13		
	repository practice innovation	1		
	repository software knowl.	2		
	repository data capture	2		
	electronic theses & dissert.	4		
	repository advocacy	3		
	repository training	2		
	open educational resources	2		
	metadata creation & mngt.	5		
	journal articles	2		
	self-archiving	1		
preservation of institut. output	3			
Sub-total		60	30.6%	
Copyright and open access advice	open access/scholarship	15		Content publication
	copyright knowledge	14		
	Creative Commons licensing	4		
	author rights advocacy	1		
Sub-total		34	17.3%	
Assessment of scholarly resources	research impact reporting	3		Content legitimization
	bibliometrics	11		
	altmetrics	9		
Sub-total		23	11.7%	
Research data management services	data curation	5		Content distribution; Content preservation
	preservation of data sets	6		
	research data management	16		
	RDM advocacy	3		
	digital humanities	1		
Sub-total		31	15.8%	
Digital library services	digital collections development	15		Content distribution; Content preservation
	digital coll. stds. application	11		
	preservation of digital content	18		
	digital initiatives/projects	7		
	digitization	17		
	digital curation	8		
	discoverability & access to digitized content	12		
Sub-total		88	44.8%	
Research support (general)	research support/SC in gen.	89		Content production
	research process/lifecycle knowl.	31		
Sub-total		120	61.2%	

Table 4. Frequency of occurrence of scholarly communication services/activities in job advertisements

Scholarly communication service	Scholarly communication positions/posts	Frequency of occurrence	-	VSCM operational element of scientific communication
Scholarly publishing services	OJS Publishing	1 2		Content publication
Sub-total		3	-	
Open access repository services	Instit. repositories Open scholarship & repository Discovery services	5 1 1		Content distribution; Content preservation
Sub-total		7	-	
Copyright and open access advice	Copyright services Open access	4 1		Content publication
Sub-total		5	-	
Assessment of scholarly resources	Research impact & research commons Bibliometrics	3 2		Content legitimization
Sub-total		5	-	
Research data management services	Data curation Digitization Assist. RDM Research data services	1 1 4 2		Content distribution; Content preservation
Sub-total		8	-	
Digital library services	Digital lib. services Digitization Digital scholarship Archivist/Archive serv. Digital archivist Curator Museologist Conservation/Preserv. Digital curation Digital initiatives	5 2 2 4 1 2 1 2 1 1		Content distribution; Content preservation
Sub-total		21	-	
Research support (general)	Research support e-Research support Postgraduate librarian Scholarly communic. Research services	13 2 3 9 5		Content production
Sub-total		32	-	

Table 5. Frequency of occurrence of scholarly communication services/activities in organisational organograms

Scholarly communication service	Scholarly communication topics	Frequency of occurrence	-	VSCM operational element of scientific communication
Scholarly publishing services	publishing industry libraries & publishing	5		Content publication
		1		
Sub-total		6	-	
Open access repository services	instit. repositories open access metadata & access social media for research discoverability	5		Content distribution; Content preservation
		1		
		1		
		1		
Sub-total		8	-	
Copyright and open access advice	copyright intellectual property licensing open scholarship	3		Content publication
		3		
		1		
		2		
Sub-total		9	-	
Assessment of scholarly resources				Content legitimization
Sub-total		0	-	
Research data management services	RDM data preservation	4		Content distribution; Content preservation
		1		
Sub-total		5	-	
Digital library services	digital technologies & information transfer digital collections – construction, development, preservation digital curation metadata standards digitization	2		Content distribution; Content preservation
		4		
		2		
		1		
		3		
Sub-total		12	-	
Research support (general)	research support in libraries research librarianship knowledge of research process/research methods knowledge creation	1		Content production
		1		
		15		
		1		
Sub-total		18	-	

Table 6. Frequency of occurrence of scholarly communication topics in LIS schools' course descriptions available on their websites

DISCUSSION

While the review of the 196 job advertisements was inclusive of all academic library professional positions, the data gathering revealed the following job titles that were associated with scholarly communication: Manager: Digitization and Digital Services; Scholarly Communications Officer/Librarian; Repository Data Capturer; Librarian/Manager: Information Systems & Digitization; Digital Curation Officer; Research & Scholarly Communications Librarian; Research Data Curator; Repository Administration & Metadata Librarian; Digital Services Officer; Research & Training Librarian; Curator: Archives & Digital Library; Manager: Research Data Services/Research Data Management & Impact; Digitization Officer; Librarian: Research Impact & Research Commons; Digital Scholarship Specialist; Archival Officer; Research Support Librarian; and, Principal Archivist. The number, range, and scholarly communication activity-specific nature of job titles, when compared to those gleaned from the literature (see Table 1), provide a good indication that university libraries in South Africa have seriously embraced new and emerging trends in scholarly communication.

A further indicator of this trend are the frequency counts for scholarly communication services/activities in job advertisements evident in Table 4. While these vary among the seven categories reflected, overall they signal a significant presence of scholarly communication requirements by university library employers in South Africa. The competency expectations in the area of scholarly communication also vary among the universities themselves, with advertisements from the more research-intensive universities such as the Universities of Cape Town, Stellenbosch, Pretoria, and Witwatersrand contributing more significantly to these frequency counts than other universities. It is not coincidental that the frequency counts and their percentages of the total number of advertisements reviewed are higher for “Digital library services” (44.8%) and “General research support” (61.2%). Representing the VSCM elements of scientific communication for content distribution and preservation (Khosrowjerdi 2011), these aspects of the scholarly communication process represent well-established areas of academic library service, that is, information distribution and preservation. Research support toward knowledge production has historically been a role of university libraries, except that in more recent years technology has accentuated this role toward more active support in the form of bibliographic reference management, plagiarism guidance, research landscape analysis, and active contribution to the research life cycle (Raju, 2017). Hence it is not surprising that general research support achieved the highest frequency count of 89 among the 196 job advertisements (45.4%). Academic libraries worldwide have in recent years become champions of open access (Burpee & Fernandez, 2014, p. 4), and hence it is not surprising that “Open access repository services” tallied a significant frequency percentage of 30.6%—this too contributing to the VSCM scientific

communication elements of *content distribution* and *preservation*, which are established university library functions. “Copyright and open access advice” (17.3%—VSCM’s *content publication*), “Assessment of scholarly resources” (11.7 %—VSCM’s *content legitimization*) and “Scholarly publishing services” (3.5%—VSCM’s *content publication*), are emerging scholarly communication areas for university libraries, and these “developing” percentages are an indication of the need for more confidence and capacity in the provision of these scholarly communication services. While “Research data management services” (15.8%) represent the well-established VSCM elements of *content distribution* and *preservation*, this too is a new scholarly communication service requiring growth in confidence and skills capacity in academic libraries.

The correlation in findings between Tables 4 and 5, both representing university library employer expectations, is useful to observe. Again “Digital library services” and “General research support,” for reasons explained earlier, dominate in frequency counts, while the emerging scholarly communication services (see Table 5), notably those representing VSCM scientific communication elements of *content production* and *legitimization*, show early beginnings of a growth trajectory. The triangulation between the job advertisements and organograms as sources of data for university library employer expectations again revealed the dominant research-intensive universities contributing more significantly to frequency counts in the new and emerging scholarly communication positions than other universities. A deviance in the South African situation is that the organograms largely reflect individual rather than team or group (across the library or the university) responsibility for scholarly communication services—the latter is a common occurrence in other parts of the world (Fruin, 2017, p. 16; Cox, 2016, p. 138). This situation might change in the future as scholarly communication services become more established in South Africa’s university libraries, especially in view of observations in the literature (Radom, Feltner-Reichert, & Stringer-Stanback, 2012, p. 18) that globally university libraries have assumed the leadership role “in organizing scholarly communication efforts at their institutions.”

A second research question which this inquiry responded to was the extent to which LIS school curricula in South Africa are responding to new and emerging scholarly communication competencies required in university libraries. While the scholarly communication service areas in Table 6 are populated with evidence of scholarly communication topics from LIS school curricula gleaned from course descriptions on their websites, it is evident that the coverage is thin particularly in certain areas; for example, ‘Assessment of scholarly resources’ shows a nil count. While on the one hand, university libraries in South Africa—particularly those supporting research-intensive universities—seem to be actively embracing new and emerging trends in scholarly communication, LIS schools’ curricula do not seem to be keeping pace with this development. This is a global trend, reported on extensively in

the literature (Gbaje, Yani, & Odigie, 2018, p. 2; Finlay & Bull, 2017, p. 17; Fruin, 2017, p. 5; Hollister, 2017, pp. 9–10; Raju, Raju, & Johnson, 2016, p. 176; Bonn, 2014, p. 3). And South Africa is no different.

While Table 6 shows a nil count for ‘Assessment of scholarly resources’, aspects of this might be embedded in course delivery. While, admittedly, this is a possibility, one also needs to take into account Hollister’s (2017, pp. 9–10) finding, in a USA-based study on scholarly communication and LIS education, that if scholarly communication and its various operational elements from *content production* to *content preservation* (Khosrowjerdi 2011) were a significant aspect of a LIS school’s curriculum, it would manifest itself in course catalogs available on websites.

CONCLUSION

Using the Operational Elements aspect the VSCM (Khosrowjerdi 2011), as well as a review of relevant literature to inform an inquiry, this study comes to the conclusion that while university libraries in South Africa, particularly those supporting research-intensive universities, are actively embracing new and emerging trends in scholarly communication, LIS school curricula in South Africa need to do more to respond to new and emerging scholarly communication competencies required in the professional workplace. This appears to be part of a global trend, as noted by Finlay and Bull (2017, p. 17): “If the percentage of scholarly communication jobs continue to increase then library schools must also increase the focus on scholarly communication in their library school courses.” In the meantime, university libraries need to respond to this skills gap by using continuous professional development opportunities to redefine existing positions and reskill for new roles in order to address scholarly communication core competencies so that they may be effective in their scholarly communication services and initiatives.

While a review of job advertisements and organograms show that on the whole university libraries are embracing the new and emerging trends in scholarly communication, some university libraries are performing better at this than others—some are still not off their starting blocks in adopting emerging scholarly communication services such as RDM, digital humanities, or research landscape analysis in an age where scholarly communication has proliferated in academic library services. Even among the universities doing well in scholarly communication services, there are newer scholarly communication initiatives that need more confidence in delivery and capacity building among professional LIS staff. The ambivalent nature of an evolving scholarly communication field with unclear definitions and boundaries demands professional practitioners who are adaptable and open to change, as well as an LIS education curriculum that is in constant review to seamlessly embrace an

evolving field propelled by advancing digital technologies. Researchers/scholars also have an obligation to interrogate the epistemologies of these changing disciplinary imperatives, and in so doing contribute, through scholarship, to the ontologies of an evolving discipline. As Steele (2014, p. 255) summarizes, “How researchers create, disseminate, access and use research . . . is a fundamental tenet in university life.” LIS educators, professional practitioners and scholars, all have a role to play in keeping this fire burning.

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