



Knowledge and skills for the digital era academic library



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ABSTRACT

Technology has altered the traditional academic library beyond recognition. These dramatic changes have impacted significantly on the knowledge and skills requirements for LIS professionals practising in this environment. While there have been studies in other parts of the world which have investigated the knowledge and skills requirements for the digital era academic library environment, to date no comprehensive study has 'drilled' down into this area in the South African context. This paper reports on a preliminary study which is part of a wider study aimed at developing a comprehensive skills statement which would provide an objective framework against which professional LIS practitioners in the modern academic library environment in South Africa may both measure their existing competencies and also identify the need for further skills acquisition. The research question guiding this preliminary investigation was: What key knowledge and skills are required for LIS professionals to effectively and efficiently practise in a digital era academic library in South Africa? The triangulated findings (using content analysis of job advertisements and semi-structured interviews) from this preliminary investigation are used to ascertain an initial picture of key knowledge and skills sets required for LIS professionals in this environment. These preliminary findings also proved useful in teasing out some of the parameters for the wider study targeting the development of a comprehensive skills statement for higher education libraries in South Africa. The study reported here has relevance for the academic library context in other parts of the world as well.

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INTRODUCTION

New methods of scholarly communication, expansion of the library's virtual space via knowledge or research commons, the proliferation of social media, and the explosive growth of mobile devices, tablets and related applications, have collectively altered the traditional academic library beyond recognition. These dramatic changes, largely the result of rapidly evolving information and communication technologies (ICTs), have impacted significantly on the knowledge and skills requirements for library and information science (LIS) professionals practising in this environment. The transformed landscape requires a new generation of LIS professionals to effectively and efficiently mediate it. Orme (2008, p. 627–628) categorised knowledge and skills required for this transformed environment into: discipline-specific knowledge (that is, knowledge that relates specifically to the LIS profession), generic skills (general skills which apply to all disciplines) and personal competencies (attitudes, values and personal traits). Choi and Rasmussen (2009, p. 465), through content analysis of job advertisements in the United States of America (USA), found that key disciplinary knowledge re-

quired for this digitally oriented environment included understanding metadata, and knowledge and experience in digital content creation and management. Generic skills such as effective communication and interpersonal skills, critical thinking, problem solving and teamwork were found by Nonthacumjane (2011, p. 283) to be required by information professionals in a digital library environment in both Norway and Thailand. Howard's (2009) Australian master's study (cited in Nonthacumjane, 2011, p. 283) highlighted personal competencies such as flexibility, adaptability and reflective thinking as being required for working in a digital library environment. What about knowledge and skills requirements for the digital era South African higher education academic library environment? To date, no comprehensive study has 'drilled' down into this area in the South African context. South Africa is richly endowed with academic libraries. These are located in the country's 23 universities. Many of these higher education libraries offer state-of-the-art LIS services to academic and research communities in universities in the country which are leading institutions on the African continent. Hence an analysis of knowledge and skills requirements for the digital era academic library environment in South Africa is important.

This paper reports on a preliminary study which is part of a wider study aimed at developing a comprehensive skills statement which would provide an objective framework against which professional LIS practitioners in the modern academic library environment in South

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Africa may both measure their existing competencies and also identify the need for further skills acquisition. Such a skills statement would also be useful in informing curriculum review and revision in LIS education and training, as academic libraries in South Africa are a major employer of LIS graduates (Ocholla & Shongwe, 2013, p. 38). There are ten LIS schools in South Africa, based in universities, which offer education and training in response to the knowledge and skills requirements of the LIS work environment. The research question guiding this preliminary investigation was: What key knowledge and skills are required for LIS professionals to effectively and efficiently practise in a digital era academic library in South Africa? The triangulated findings (using content analysis of job advertisements and semi-structured interviews) from this preliminary investigation are used to ascertain an initial picture of key knowledge and skills sets required for LIS professionals in this environment. These preliminary findings also proved useful in teasing out some of the parameters for the wider study targeting the development of a comprehensive skills statement for higher education libraries in South Africa. While these early findings draw from South African higher education libraries, the study is contextualized within global trends affecting higher education libraries and hence has relevance for other parts of the world as well.

LITERATURE REVIEW

A review of pertinent literature locates this study in the global context of the changing academic library and its impact on knowledge and skills requirements for academic libraries in the digital era.

THE ACADEMIC LIBRARY IN THE DIGITAL ERA

As technology continues to impact on the delivery of information services, traditional academic library systems, point out Choi and Rasmussen (2006, 2009), have come to embrace the digital library model. Academic libraries have evolved from focusing on the management of physical resources and related services to “transforming resources and services into digital formats to support teaching, learning and research” (Choi & Rasmussen, 2009, p. 457). O’Connor and Au (2008, p. 57) too state that the academic library has changed dramatically and with this change the “conception of a digital library has become a reality”.

Changes in areas of teaching and learning, influenced and enabled by technology, remarks McCarthy (2005), have impacted on academic libraries – for example, the creation of new knowledge products such as subject portals and subject specific websites to support teaching and learning; or the re-purposing of physical spaces and the expansion of virtual spaces to support new pedagogies and changes in the teaching and learning process.

In terms of research, Luce (2008) explains that the “convergence of exponential increases in computing, storage, online sensors, and bandwidth” has enabled scientists and researchers to collaborate in new ways thus leading to the rise of eScience and eResearch. eScience developments now characterise not only the Science, Technology, Engineering and Medicine disciplines but the Humanities and Social Sciences as well. The convergence of technologies has led to “new ways of thinking about and understanding physical, biological and social phenomena” (Luce, 2008). These revolutionary developments have demanded an equally dramatic shift in the way academic or research libraries serve the needs of scientists in the new eScience and eResearch contexts.

Luce’s (2008) advice to academic libraries which are positioning themselves to support eResearch, is to be cognizant of the fact that knowledge preservation becomes one of the key roles of such a library. Luce (2008) goes on to emphasize that this knowledge preservation necessitates:

- Ensuring the quality, integrity, and curation of digital research information;

- Sustaining today’s evolving digital service environments;
- Bridging and connecting different worlds, disciplines, and paradigms for knowing and understanding; and
- Archiving research data in a data world.

Hence to enable digital capture, curation, preservation and sharing of knowledge, the academic library in the digital era needs to reflect a service environment that embraces digitization, electronic publishing, Web 2.0, Web 3.0, Library 2.0, Library 3.0, social media, open access, and a host of other fast evolving ICTs. As academic libraries the world over shift into this digital era, these developments and innovations impact on the knowledge and skills profiles of LIS professionals in academic libraries (Choi & Rasmussen, 2009, p. 457; Nonthacumjane, 2011, p. 280). New skills sets are required to mediate this digitally oriented academic library environment.

KNOWLEDGE AND SKILLS REQUIREMENTS IN THE DIGITAL ACADEMIC LIBRARY ENVIRONMENT

A study of job advertisements by Orme (2008, p. 630) found that “a mixture” of discipline-specific knowledge (also referred to as professional knowledge), generic skills and personal competencies is required of LIS professionals in a digitally oriented LIS environment. Nonthacumjane too (2011, p. 280, p. 286), in a study that probed the “skills and competencies required for LIS professionals to be effective and efficient working in the digital era”, concludes that they should be able to dynamically exercise “personal, generic and discipline-specific skills”.

DISCIPLINARY KNOWLEDGE

Partridge and Hallam (2004) use the “double helix image of human DNA” to argue that both disciplinary knowledge and generic capabilities “make up the genome of the successful information professional in the information age”. Many have argued that the new digitally oriented academic library is a renewed conceptualisation of traditional LIS resources and services, now undergirded and driven by new technologies (Choi & Rasmussen, 2009, p. 465; Gerolimos & Konsta, 2008, p. 697; McCarthy, 2005, p. 45; Middleton, 2003, p. 42; Missingham, 2006, p. 266). Hence in a digital academic library environment core knowledge and skills of traditional librarianship are important but need to be augmented by new technological knowledge (Choi & Rasmussen, 2009, p. 465).

Tammaro (2007, p. 237) cogently points out that

cataloguing and classification skills have much relevance to the Web...a more thorough knowledge of the major schemes and their working principles is required to allow a person to adapt and accommodate existing metadata schemes to use, and to possess the basic expertise to construct new schemes.

Digital library applications are closely linked to Web technology (Choi & Rasmussen, 2009, p. 463). Consequently, as modern academic libraries move into the creation of digital content and its organisation and preservation through metadata creation and management to make their special collections more accessible via the Web, the need for knowledge of the following technologies becomes critical: digital library architecture and software, technical and quality standards, HTML coding, general computer skills and computer literacy, database development and management, Web mark-up languages such as SGML and XML, and Web development and design (Choi & Rasmussen, 2006; Choi & Rasmussen, 2009, p. 463). Ocholla and Shongwe (2013, p. 39, 42) in their content analysis of job advertisements in South Africa over a four-year period (2009–2012) found IT skills to be very sought after in libraries as “more information services”, particularly in academic and research environments, become “IT or e-access and e-service dependent”.

Parallel to the development of digitization and curation of unique collections, the academic library in the digital era is also being challenged by an emerging trend of research data management and curation (Wise, Henninger, & Kennan, 2011, p. 279). The emergence of eScience and eResearch is accompanied by the generation of vast amounts of research data in need of collection, preservation, management and provision for future access to enable re-using, re-purposing, re-combining, etc. According to Luce (2008) metadata is an essential component of research data and research or academic libraries, because of their traditional knowledge base, are well positioned to “lead the development of standardized, ontologically rich automated metadata” for research data sets. Here again, disciplinary knowledge, that is, the creation and management of metadata which are established tasks in the LIS profession, allows academic libraries to take responsibility for the curation and preservation of data for its re-use when needed (Luce, 2008). The Ocholla and Shongwe (2013, p. 41) study makes reference to “new job titles” emerging in the LIS job market in South Africa and puts forward that “these new titles represent strong ICT elements” and shows the influence of ICTs on emerging knowledge and skills requirements in the LIS sector. In the USA, Riley-Huff and Rholes (2011, p. 129–130, p. 135) make a similar observation in their survey of library administrators and librarians from academic libraries: “new job categories are being defined in LIS” which “while centering on core librarianship principles [knowledge organisation; knowledge dissemination; etc.]”, or what this paper has been referring to as disciplinary knowledge, call for a “significant technology skills set” (a point alluded to earlier).

GENERIC SKILLS

Also referred to as ‘transferable skills’ or ‘graduate attributes’ (Partridge & Hallam, 2004), generic skills refer to life skills such as communication and interpersonal skills, critical thinking, problem solving and teamwork which allow individuals to function not only in disciplinary or subject domains but also in employment and social situations. Orme’s (2008, p. 626) content analysis of job advertisements in the USA revealed that from among disciplinary, generic and personal skills, “generic skills were most frequently sought”, followed by disciplinary and then personal skills. Orme (2008, p. 626), however, emphasizes that while this supports the ‘move to the generic’ argument in the literature (Kennan, Cole, Willard, Wilson, & Marion, 2006, p. 190–191; Wise et al., 2011, p. 281) (that is, it has become important to appoint individuals with, for example, a capacity for continuous learning and who are adaptable in a fast changing work environment rather than those who simply possess specific disciplinary knowledge), disciplinary knowledge remains important to LIS employers. This, according to Orme (2008, p. 626), is evidenced by the marked presence of disciplinary or professional skills in the top twenty most frequently sought requirements examined.

The literature reveals communication skills to be among the most highly ranked generic skills (Gerolimos & Konsta, 2008, p. 695; Middleton, 2003, p. 48; Orme, 2008, p. 629; Reeves & Hahn, 2010, p. 112). Of particular relevance to the modern academic library is the observation that the demand for interpersonal skills is a reflection of the “reality that team-based approaches are a common practice in digital projects and interpersonal skills are a key to success in team efforts” (Choi & Rasmussen, 2009, p. 464). While general computing or computer literacy, like information literacy, would categorise as a generic skill, technology skills, for the purpose of this paper, have been discussed above under disciplinary skills because of the close alignment between digital library applications and ICTs (Riley-Huff & Rholes, 2011, p. 130). A similar principle is applicable to managerial skills, particularly in the context of the management of digitization, curation and data management projects.

PERSONAL COMPETENCIES

Choi and Rasmussen (2009, p. 457) identify from the literature the following personal attributes as being important in the LIS work environment: capacity for continuous learning, flexibility, fostering change and the capacity to work independently. To this list may be added enthusiasm and self-motivation (Orme, 2008, p. 621–622), reflective thinking, and the ability to respond to others’ needs (Howard (2009) cited in Nonthacumjane, 2011, p. 283). Choi and Rasmussen (2009, p. 464) highlight “adaptive skills to keep up with changes and challenges within library and information environments”.

While some studies, for example Partridge and Hallam (2004), have conflated generic skills and personal attributes into a single category of generic capabilities, this paper has kept them separate for ease of analysis of data collected. It is evident from the review of literature that findings from studies of job requirements in the LIS professional sector, including the academic library sector, demonstrate the need for new generation LIS professionals to be “multi-skilled” (Orme, 2008, p. 624; Reeves & Hahn, 2010, p. 118; Wise et al., 2011, p. 291). In order for LIS professionals to effectively mediate the digital academic library environment, they would need to embrace a blend of discipline-specific knowledge, generic skills and personal competencies. Partridge and Hallam (2004) reiterate this: “...generic capabilities [which may include personal competencies] and discipline knowledge are quite significantly intertwined and interrelated and vital for success as a library and information professional in the twenty first century”. Orme’s (2008, p. 629–630) study concludes that to this “mixture” one needs to add experience as a significant number of job advertisements require experience in disciplinary and/or generic skills. Reeves and Hahn (2010, p. 115) too, in their survey of job advertisements, found that “a great many job ads requested work experience in specific functional areas of libraries...”, particularly in technical service functional areas such as that requiring “cataloguing and metadata experience”.

Table 1 summarises the preponderance in the literature of some of the broad trends relating to knowledge and skills requirements in the digital era academic library environment. In attempting such a table of findings from the literature, the researcher selected for inclusion in the table, only literature that:

- reported more recent studies (roughly the last 10 years, 2004–2013, but favouring more recent years);
- reported on key survey studies involving content analysis of mainly job advertisements (as the present study does) as well as literature and practitioner/employer surveys on LIS knowledge and skills requirements; and,
- included at least one recent significant South African study in the area of LIS workplace knowledge and skills requirements.

While ‘...technology associated with LIS application...’ is treated as a separate trend in Table 1 (for purposes of honing in on this significant trend), in other parts of this paper, as explained earlier, it is discussed under disciplinary skills due to the close association between digital library applications and ICTs. Table 1 also provides percentages (calculated against the 11 core research papers selected by the researcher for inclusion in the table) reflecting relative preponderance in the literature of the identified trends. Table 1 proves useful, in the Discussion section of this paper, in effecting comparisons between the findings of the preliminary study being reported and that in the literature reviewed in this paper.

METHODOLOGY

The preliminary study reported here adopts a qualitative approach by using content analysis of job advertisements and semi-structured interviews with purposively selected academic library professional LIS personnel to preliminarily ascertain the knowledge and skills requirements for a modern academic library in South Africa. As mentioned at

Table 1
Knowledge and skills requirements for the digital era academic library.

Knowledge & skills requirements	Partridge and Hallam (2004)	Kenman et al. (2006)	Missingham (2006)	Choi and Rasmussen (2006, 2009)	Gerolimos and Konsta (2008)	Orme (2008)	Reeves and Hahn (2010)	Nonthacumjane (2011)	Riley-Huff and Rhoads (2011)	Wise et al. (2011)	Ocholla and Shongwe (2013)	%
Mixture of disciplinary knowledge, generic skills & personal competencies	✓					✓	✓	✓		✓	✓	55%
Disciplinary knowledge still has a strong presence in the list of sought after skills	✓			✓		✓	✓	✓				45%
Generic skills are being increasingly emphasized by employers as priority skills requirements		✓		✓	✓	✓	✓			✓		55%
Personal skills are considered important but lag behind disciplinary knowledge and generic skills in priority				✓		✓		✓				27%
Strong demand for technology skills associated with LIS applications in the digital era			✓	✓	✓		✓	✓	✓		✓	64%

the outset, the research question guiding this preliminary investigation was: What key knowledge and skills are required for LIS professionals to effectively and efficiently practise in a digital era academic library in South Africa? Content analysis is a commonly used descriptive technique for analysing the content of a document or other communication to discover features and patterns (Neuman, 2006, p. 44). Content analysis of job advertisements is a well-established method of researching requirements of the employment market in a particular sector (Orme, 2008, p. 620, p. 623) and is very useful in reflecting the demands of employers, employment opportunities and emerging trends in the employment market.

In view of the fact that this study was a precursor to an envisaged wider study, the *Mail & Guardian*, a weekly newspaper known nationally for carrying advertisements for vacancies in the higher education sector in South Africa, was initially used as a single source of advertisements for professional LIS posts (that is, posts requiring a professional LIS qualification) in academic libraries in South Africa. The researcher (towards the end of 2012) attempted to source relevant advertisements from the popular 'Jobs and Academic' section of the newspaper made available to the researcher at the newspaper's Cape Town satellite office. The researcher began searching, retrospectively, for advertisements from 2008 onwards on the assumption that this would deliver a significant number of 'recent' advertisements for LIS professional positions in academic libraries.

The *Mail & Guardian* did not have a publically available electronic means of searching its content – hence the retrospective searching had to be done manually. The researcher did not have access to issues of the newspaper that were at the binders at the time of searching. Added to this was the fact that a more recent trend is that many institutions do not place the full advertisement in the press – often an abbreviated form, largely for reasons of costs, appears with a URL to access the full advertisement which is removed from the relevant website once the closing date has passed, thus 'blocking' access to important research data. Reeves and Hahn (2010, p. 118) also allude to this difficulty: "... job ads typically appear now online, ... a distinct advantage for job-seekers, but a serious problem for future studies of this type if the ads are not captured and stored before they disappear". The net result of the retrospective searching for advertisements was that only 39 were found. The researcher supplemented this by searching differently for 2013 advertisements. The *Mail & Guardian* was purchased on a weekly basis and scanned immediately for relevant advertisements, including searching websites referred to by abbreviated advertisements. Over and above this, *LiasaOnline*, which is the listserv of the Library and Information Association of South Africa (LIASA), was accessed for relevant advertisements, following the advice that "...online job ads are essential to getting a comprehensive picture of the job market (Reeves & Hahn, 2010, p. 105)". This approach for the whole of 2013 yielded a further 32 advertisements bringing the total to 71 (excluding duplicate) advertisements.

To triangulate findings from the job advertisements for this exploratory exercise, the researcher purposively selected, for conducting semi-structured interviews, three professional LIS staff members each (six interviews in total) from the academic libraries of the University of Cape Town and Stellenbosch University, two of South Africa's research-led universities with world rankings – an obvious indicator of their state-of-the-art academic libraries. It was also the intention of the researcher to use this modest number of interviews to trial this particular method of data collection for this type of study.

The interviewees in the purposive sampling were selected based on the researcher's knowledge and research experience (Welman, Kruger, & Mitchell, 2005, p. 69) with the identified research sites (the two academic libraries). This purposive selection included individuals occupying positions such as Senior Librarians (2) of branch library collections (Medicine and Law), Manager (1) of a disciplinary information service (Commerce), an institutional repository Manager (1), the Head (1) of Digitization Services and a Director (1) of Client Services

and e-Scholarship in the university library and information services. The researcher was confident that the occupants of these positions would be a rich source of data needed to respond to the research question generated for this preliminary investigation. Each interview lasted about an hour and was based on a set of questions around disciplinary knowledge, generic skills and personal competencies relating to the interviewee's position as well as the LIS service in general. Depending on the responses from the interviewees, the researcher, where possible, probed further in an attempt to enhance the richness of the data collected.

ANALYSIS AND FINDINGS FROM THE PRELIMINARY INVESTIGATION

This preliminary investigation did not focus on job titles and qualifications required but rather scanned the contents of advertisements for requirements relating to disciplinary knowledge, generic skills and personal competencies. These knowledge/skills categories were identified in the literature (Choi & Rasmussen, 2009; Nonthacumjane, 2011; Orme, 2008) reviewed for this study as being the main categories into which the knowledge and skills requirements for LIS professionals in a digital LIS environment, may be grouped. A chart (see Table 2) was created with these categories and each of these categories was populated with relevant knowledge and skills that emerged in the review of literature for this study. To supplement this and, importantly, for the chart to be a more accurate reflection of the skills requirements for the digital era academic library environment, the ACRL 2012 top ten trends in academic libraries (ACRL Research Planning & Review Committee, 2012) was consulted and the following three items of disciplinary knowledge were added: scholarly communication, e-resources collection development, and research support librarianship. Further, where necessary, knowledge and skills included in the categories were “iteratively extended and refined” (Wise et al., 2011, p. 275) during the analysis of the data – that is, as the researcher worked through the contents of the job requirements sections of the advertisements and the transcripts of the interviews, where necessary, required skills sets were grouped together under a general attribute if they were part of a generic group of skills or separated into specific attributes if they fell into distinct skills requirements, depending on the pattern that unfolded as the researcher meticulously worked through the content of the job requirements data collected.

The advertisements were scrutinized for requirements and these were allocated to the skills categories on the chart. Data was gathered from the requirements sought by the employers and not from the duties or responsibilities of the post, unless this referred to a particular requirement (Orme, 2008, p. 624). Each requirement was recorded on the tally chart. Once this was done for all the advertisements, the counts were totalled to produce frequency counts allowing for “an assessment of the relative importance of the different requirements and the areas into which they fall” (Orme, 2008, p. 624). A total of 71 advertisements were analysed. A similar process was applied to the data collected from the six interviews (a total of about 6 h of interviewing) except here the researcher had to wade through much qualitative data and had to be mindful of not capturing repetitions. The frequency counts (together with percentages) from both the data sets are reflected in Table 2. Fig. 1, using a bar graph, captures the totals (and corresponding percentages) for each of the skills categories. Juxtaposing the totals from the two data sources (job advertisements and interviews) on the graph allows for comparison of trends between the two data sets, for purposes of triangulation.

DISCUSSION, CONCLUSIONS AND LESSONS FOR THE WIDER ACADEMIC LIBRARY SKILLS STUDY

This section discusses the findings from this exploratory study in relation to the literature reviewed and based on this discussion draws conclusions in response to the research question: What key knowledge

and skills are required for LIS professionals to effectively and efficiently practise in a digital era academic library in South Africa? A secondary purpose of this preliminary investigation was to tease out some of the parameters for the wider study targeting the development of a comprehensive skills statement for higher education libraries in South Africa. Hence this section also looks at some of the lessons gained from this exploratory investigation for the wider study.

DISCUSSION AND CONCLUSIONS

As revealed in the literature (Nonthacumjane, 2011; Orme, 2008; Partridge & Hallam, 2004; Wise et al., 2011) and reflected in Table 1, in this study too it emerges that a variety of skills and competencies are required of the modern LIS professional. A key convergence in findings between this South African study and similar ones in the USA, United Kingdom and Australia cited in the review of literature, is that generic skills emerged as being the most required skills set (see Fig. 1). Table 1, which captures key trends from the literature relating to academic library knowledge and skills requirements, shows a 55% preponderance of the trend of employers increasingly emphasizing generic skills as priority skills requirements. At the same time, Orme (2008, p. 626) observes that despite the ‘move to the generic’ argument in the literature (Kennan et al., 2006, p. 190–191; Wise et al., 2011, p. 281), and also evident in the findings of the study reported here, disciplinary knowledge is still valued by LIS employers, as evidenced in their US study by a strong presence of disciplinary skills in the top twenty list of frequently sought skills (see also Table 1 – 45% preponderance of this trend reflected in the literature). The current study lends weight to this argument when one observes in Table 2 the high frequency counts against, for example, ‘traditional LIS resources, services and functions’ (71 and 21, respectively) in both the job advertisement and interview data sets. This South African study, like those abroad, also saw personal skills, while sought by employers, lagging behind disciplinary knowledge and generic skills in popularity (see Fig. 1). Findings from the literature, summarised in Table 1, reiterate this point by reflecting this as a notable trend in the literature.

‘Technology associated with LIS applications in the digital era’ as a required knowledge/skills set achieved a high frequency count in the job advertisement data set (see Table 2). This is not surprising given the impact of technology on the academic library of the digital era, as detailed in the literature (Choi & Rasmussen, 2009; Luce, 2008; McCarthy, 2005; O'Connor & Au, 2008; Ocholla & Shongwe, 2013; Reeves & Hahn, 2010) and reflected in a 64% preponderance of this trend in the literature (see Table 1). While this exploratory study conflated all technology associated with LIS applications into one skills category, in the wider study envisaged it would be useful to separate this into knowledge of and familiarity with systems software on the one hand, and technical skills on the other. Such technical skills would include digital library architecture and software, technical and quality standards, HTML coding, Web mark-up languages such as SGML and XML, and possibly even some skills in programming and scripting languages. Such a separation would be useful to determine to what extent IT technology skills are becoming a necessity in the education and training of academic library LIS professionals. This IT skills set becomes particularly relevant when one considers that the literature is very emphatic about the fact that the digitally oriented academic library is a renewed conceptualisation of traditional LIS resources and services that is now underpinned and driven by new technologies (Choi & Rasmussen, 2009, p. 465; Gerolimos & Konsta, 2008, p. 697; McCarthy, 2005; Middleton, 2003, p. 42; Missingham, 2006, p. 266) or that “LIS [particularly in the digital academic library environment] is becoming an increasingly technology-driven profession” (Riley-Huff & Rhoads, 2011, p. 129). This would also explain ‘Technology associated with LIS applications in the digital era’ following closely on the heels of ‘Traditional LIS resources, services and functions’ in the upper end of frequency counts in the job advertisement data set in Table 2.

Table 2
Knowledge and skills requirements in the digital era academic library in South Africa.

Disciplinary knowledge	Job adverts		Interviews		Generic skills	Job adverts		Interviews		Personal competencies	Job adverts		Interviews	
	Freq.	%	Freq.	%		Freq.	%	Freq.	%		Freq.	%	Freq.	%
Traditional LIS resources, services and functions	71	33%	21	46%	General managerial/supervisory skills	48	19%	6	11%	Enthusiasm and initiative	18	26%	2	9%
Experience	42	19%	3	6.5%	Communication (written and oral)	33	13%	6	11%	Leadership	13	19%	3	13.6%
Technology associated with LIS applications in the digital era	40	18%	3	6.5%	Interpersonal skills	26	10.2%	2	3.5%	Capacity to work independently	11	16%	–	–
Scholarly communication	18	8%	3	6.5%	General computer skills and computer literacy (including social media skills)	25	10%	9	16%	Ability to work under pressure	11	16%	1	4.5%
e-Resources collection development	13	6%	5	11%	Client service orientation	23	9%	4	7%	Ability to respond to others' needs	6	8.7%	3	13.6%
Research support librarianship	11	5%	2	4%	Teamwork	21	8%	3	5%	Adaptability and flexibility	5	7.2%	3	13.6%
Subject knowledge with professional LIS skills	10	4.6%	1	2%	Critical and analytical thinking	15	6%	–	–	Capacity for continuous learning	2	3%	6	27%
Digitization (creating digital content)	6	3%	3	6.5%	Teaching and coaching	12	5%	9	19%	Fostering change	1	1.5%	1	4.5%
Curation of digitized content (including metadata creation and management)	4	2%	3	6.5%	Budgeting	8	3.1%	1	1.5%	Reflective thinking	1	1.5%	1	4.5%
Research data services (including collection, metadata creation and preservation for future use)	2	1%	2	4%	Problem solving	7	2.7%	1	1.5%	Self-motivation	1	1.5%	2	9%
					Project management	6	2.3%	1	1.5%					
					Accuracy and attention to detail	5	2%	2	3.5%					
					Strategic planning	5	2%	2	3.5%					
					Branding and marketing	4	1.5%	2	3.5%					
					Information literacy	4	1.5%	3	5%					
					Research skills	3	1.2%	2	3.5%					
					Writing/editing skills	2	1%	2	3.5%					
					Experience	2	1%	–	–					
					Conflict management skills	2	1%	–	–					
					Continuing professional development	2	1%	–	–					
					Performance management and evaluation skills	1	0.5%	1	1.5%					
Total	217	100%	46	100%		254	100%	56	100%		69	100%	22	100%

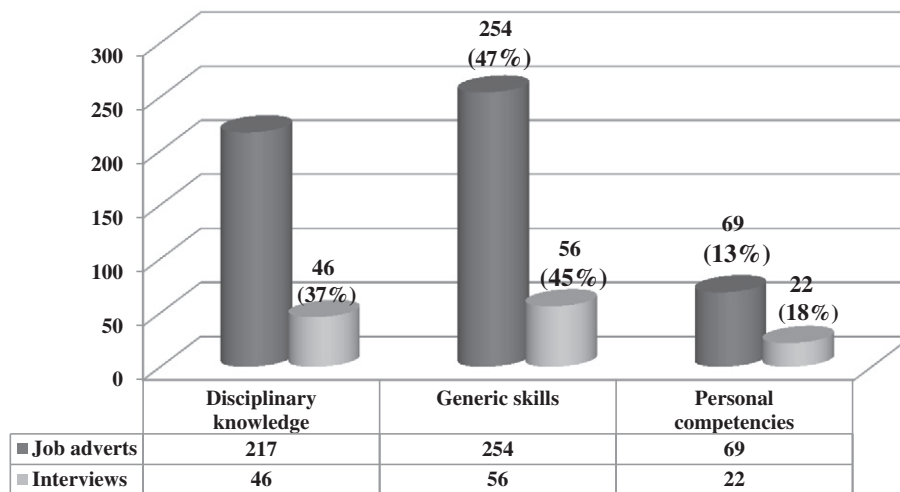


Fig. 1. Knowledge and skills requirements in the digital era academic library in South Africa.

The high job advertisement frequency count against ‘Experience’ in the disciplinary knowledge skill set (42 – see Table 2) implies, as Orme (2008, 629) suggests, that for employers knowledge, skills and personal attributes alone are “insufficient without an ability to demonstrate their practical application”. The job advertisement frequency counts for, ‘Scholarly communication’, ‘e-Resources collection development’ and ‘Research support librarianship’ (see Table 2) indicate that these skills areas have taken hold in the modern academic library in South Africa and are on an upward trajectory as suggested in the literature (Choi & Rasmussen, 2009; Luce, 2008; Nonthacumjane, 2011) about academic libraries in other parts of the world. ‘Scholarly communications’, particularly, received quite a boost in frequency counts from among 2013 advertisements, indicating an increasing demand in the digital academic library environment for knowledge of new trends in scholarly communications. Combining subject knowledge with professional LIS skills is somewhat of a grey area with just one interviewee in the current study claiming that this is “the ideal” which the LIS service should strive for. Partridge and Hallam (2004) report that “subject discipline” may become more and more important” ...especially in fields such as law and medicine where LIS professionals need to “develop or acquire skills and knowledge unique to that field”. Not co-incidentally, the frequency count of 10 for subject knowledge requirement in Table 2 emanates largely from law libraries. The rest of the interviewees (five) believed that while having the ‘subject discipline’ was an advantage, this is “hardly a reality—it is difficult to find a medical graduate working in a medical library”.

The emergence on the radar screen of new skills types such as ‘Curation’ and ‘Research data services’, albeit with low frequency counts (see Table 2), represent in the South African context too the “emerging trend of research data management and curation” (Wise et al., 2011, p. 279) accompanying the emergence of eScience and eResearch (Luce, 2008), as has been observed by researchers in academic LIS services internationally. South African academic libraries too, like their overseas counterparts are being confronted, in a context of a shortage of skills and training in this area, with the challenge of developing data-archiving infrastructure for the description, management, access and sharing of data (University of Melbourne, 2008). The researcher is convinced that in another year or so, the frequency counts in these new skills areas (digitization, curation, research data service) would rise significantly.

While the generic skills set in Table 2 is led by ‘General managerial/supervisory skills’ with a frequency count of 48 (in the job advertisement data set), this high figure might be the result of the fact that this skills category, like the ‘Traditional LIS resources, services and functions’

category in the disciplinary knowledge section, was a generic skills category that pooled together a number of different skills. In the wider study planned, these aggregated categories should perhaps be thinned out for a more accurate reflection of knowledge and skills trends. Notwithstanding this, the generic skill ‘Communication’ which traditionally is reflected in the literature as the most highly ranked generic skill (Gerolimos & Konsta, 2008, p. 695; Middleton, 2003, p. 48; Orme, 2008, p. 629), does reflect in Table 2 as a noticeably highly ranked generic skill, both in the job advertisement as well as in the interview data sets. Mention needs to be made of ‘Interpersonal skills’, ‘General computer skills and computer literacy’, ‘Client service orientation’ and ‘Teamwork’ – these are generic skills which also notched up significant frequency counts (see Table 2) lending weight to the ‘move to the generic’ trend evident in the literature (see Table 1) as well in the findings reported in this paper (see Fig. 1 and Table 2). This increasing tendency towards a demand for skills relating to generic capabilities, over and above disciplinary or professional knowledge and skills, is also reflected by the longer list of skills requirements in the generic skills set compared to the other two (see Table 2). The 2013 job advertisements, particularly, surfaced noticeable requests for generic skills relating to project management, strategic planning, branding and marketing, budgeting, performance management and evaluation, etc. (see Table 2). Digital academic libraries are expensive enterprises, and hence it is not surprising that these generic skills are in demand to ensure the efficacy of these enterprises.

It would seem that the knowledge and skills required for LIS professionals to effectively and efficiently practise in a digital era academic library in South Africa are a blend of discipline-specific knowledge, generic skills and personal competences, with some of these skills types being more valued in this context than others. At the same time, these LIS professionals, like their counterparts in other parts of the world, are also being challenged by new and emerging skills requirements. Many of the latter are a re-conceptualisation of traditional LIS skills using new technologies and hence it is important for the new generation LIS professionals to use this knowledge base to adapt existing skills to respond to new ‘problems’ in a working environment that is constantly changing. LIS education and training in South Africa too needs to evolve to meet the challenges of the new knowledge and skills requirements of the digital age academic library in South Africa which is a major employer of LIS graduates.

While the intention of this preliminary study was to ascertain an initial picture of key knowledge and skills sets required for LIS professionals in this environment, a secondary intention was to tease out of this exploratory investigation some of the parameters for the wider

study targeting the development of a comprehensive skills statement for higher education libraries in South Africa. Hence this paper ends by highlighting lessons for the wider study.

LESSONS FOR THE WIDER STUDY

This exploratory study was useful in revealing the limitations of relying on a single data source for job advertisements, no matter how good a source it is. It was also instructive in revealing that in the current digital age, online sources of job advertisements are a must if one wants a “comprehensive picture of the job market” (Reeves & Hahn, 2010, p. 105). Hence the envisaged wider study would need to target multiple sources of job advertisements, such as other newspaper titles, online mailing lists (particularly those of the professional body (LIASA) and relevant websites. This is likely to provide a more complete picture of the LIS employment market in South Africa.

While this small study depended on manually tallying the frequency of skills requirements identified through content analysis, the bigger study (with bigger data sets) could make use of content analysis software such as *Provalis Simstat* and *Wordstat* (Wise et al., 2011, p. 275) used in other successful job advertisement studies. The interviews too were time-consuming, geographically restricting (to the Western Cape) and its more qualitative nature did not blend very naturally with the type of data collected from the job advertisements which lent itself more to quantification and hence more convenient analysis during the triangulation process. Moreover, the interviews, due to limitations to the number that can be conducted over a specified period of time, did not prove, in the end, to be such a productive source of research data for this type of study. Based on this research experience and the knowledge gained from this exploratory exercise, the researcher would suggest that the wider study, instead of gathering data via semi-structured interviews, make use of quantitative survey data collected via the use a structured Web-based questionnaire administered to LIS professional staff from academic libraries scattered across the country, for a truly national picture and a more efficient triangulation of data sources. Content analysis software could be used to analyse the much larger volume of data that is intended for collection. The use of data analysis software with a larger volume of data would also allow for more than just frequency counts. Other more sophisticated analyses such as co-occurrence and multivariate analyses (Wise et al., 2011, p. 283) could be employed, thus allowing for deeper analysis and a more complete picture of the requirements of employers, employment opportunities and emerging trends in the LIS employment market.

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