

# The Presence of IT Skill Sets in Librarian Position Announcements

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What skills do librarians need in today's world with its Google-esque movement toward ubiquitous instant information? Anecdotal evidence suggests librarians are acquiring a wider range of information technology (IT) skills. This study examines the IT skills employers deem essential by conducting a content analysis of randomly selected job ads from ALA's online JobList over a five-month period. We found a substantial need for Web development, project management, systems development, and systems applications. This suggests that librarians are incorporating a significant subset of IT professionals' skill sets. This trend poses challenging questions for their identity and profession.



What IT skills do employers want librarians to have in the current job market? Are traditional skills of cataloging, bibliographic instruction, ILL, and reference still the driving forces behind selection of librarians? Are information technology (IT) skills such as project management and Web development becoming the driving forces? What technology skills do librarians need in a world that is no longer print driven?

Librarians have long been called upon to stretch the boundaries of their standard skill sets. For example, in the early 1980s, librarians began using OCLC to catalog their materials and WorldCat to share resources. Have the computerization of library services and the Internet (as both a social and an information network) led to a change in skills required for librarians? Has the shift from print-driven media to digital media changed their identity?

Clearly the acquisition of the skills required to access, store, manage, and disseminate media (such as electronic books and journals, print materials, audiovisual materials, and Web sites) in libraries is yet another example from the long history of librarians adapting to and adopting new technologies. Further, we believe that librarians are being called upon not only to manage media itself, but also to acquire, develop, deploy, use, and maintain the suite of information technologies and systems that support them. The development of a digital collection or an institutional repository requires the traditional skills of collection development as well as new skills of server setup and maintenance, to name just two. These new skills are commonly associated with Information Science (IS) disciplines such as information systems, computer science, information tech-

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nology, and software engineering. For example, developing and managing a Web site may require knowledge of programming languages (such as JavaScript and Perl) and networking concepts (such as IP addressing and server operating systems). The objective of the study is to determine the validity of our belief that librarians are now being required to have these skills.

The questions are these: which IT skills are currently required of librarians and what is their relative importance? The goal of this study is to assess the magnitude of the current intersection between the skill sets of librarians and the skill sets of IT professionals. The importance of this question cannot be understated, as it has implications for the very definition of our profession.

### Literature Review

Our study analyzes library positions from an information systems (IS) standpoint. (For the purposes of this study, information systems, information science, and information technology are treated as synonymous.) The IS literature was reviewed to determine a basic set of skills for information technology professionals, while the library literature was reviewed for earlier content analyses of library job positions. These content analyses have all been coded and analyzed solely by librarians.

Content analysis studies of library position announcements have appeared numerous times in the literature and have been typically applied in three categories: by specific skills, by specific position types, and/or by general issues. Our study analyzes for specific skills and is of concern because these skills help to define the library profession. In 1989, Michael Malinconico addressed the skill sets and educational requirements that librarians need in "an age of technology."<sup>1</sup> He found that curriculums should prepare librarians to deal with technology and concluded "librarians need not become technicians in order to take advantage of the capabilities of modern technologies.

However, they do need to understand how to manage technology and how to harness it for their own ends."<sup>2</sup>

While librarians do not have to become technicians, do they need computer skills? Penny Beile and Megan Adams's content analysis of library position announcements found that "as information sources in academic libraries are delivered increasingly via an electronic medium, the degree to which computer skills are sought by libraries becomes an important concern."<sup>3</sup> These authors' analysis compared computer skills among service areas and found that the emerging category of electronic services required computer skills 91.4 percent of the time as compared to public services 62.8 percent and technical services 59.3 percent. Beile and Adams's data from 1996 showed that 66.9 percent of all advertised positions required computer skills.<sup>4</sup>

More recently a distinction has been made between electronic and digital services, a distinction that was the subject of a content analysis by Karen Croneis and Pat Henderson. They concluded that the nature of library work has changed and found an "increasing number of electronic or digital position announcements, a greater diversity of functional areas involved, a wider variety of institutions placing advertisements and the emergence of distinctions between 'electronic' and 'digital' positions in terms of job responsibilities."<sup>5</sup> They concluded that the number of positions requiring expertise in electronic and/or digital technology has dramatically increased and that many other positions now involve traditional responsibilities in "technologically sophisticated surroundings." Their findings demonstrated "the nature, magnitude, and swiftness of changes in the profession because of technology. Libraries are putting more emphasis on electronic and digital information resources. Specialized job responsibilities have emerged to handle resources."<sup>6</sup> In contrast, John Shank's content analysis concerned a single position type—the Instructional Design Librarian,

which he called a “blended librarian.” He concluded: “It should come as no surprise that, in the current environment, where there is a proliferation of print and electronic resources, libraries are seeking to create positions that utilize technology to help with user education.”<sup>7</sup>

What computer skills should librarians in general have? Yuan Zhou’s in-depth analysis of computer skills for academic librarians offered a definition of computer skills. He listed experience with bibliographic utilities such as OCLC or RLN; automated library systems including general knowledge of library automation, online database searching, microcomputer applications, mainframe computer applications, microcomputer applications, CD-ROM products, computer languages or programming, computer hardware, and possession of a degree in computer science. He added four additional aspects in 1994: networks such as LAN or WAN, Internet searching, resources in electronic formats, and image technology or multimedia. His study presented evidence that the need for computer skills had increased from 10.3 percent to 88.9 percent from 1974 to 1994.<sup>8</sup>

Not all IS skills are necessarily electronic. One such skill—project management—was the focus of Jane Kinkus’s content analysis study. Project management as a skill for librarians became recognized with the creation of the Library Project Management Institute in 1999 by ARL. She noted that, in 2005, the term project management appeared in twenty-three articles in the library literature. Very few library schools offered coursework in project management. Kinkus concluded that project management is a skill that is becoming increasingly valued as job announcements requiring project management skills increased from 4.1 to 11.2 percent from 1993 to 2003.<sup>9</sup>

How are IS skill sets defined? Nansi Shi contends that IS skills “will evolve to become a mix of technical, business, organizational and consulting areas,”<sup>10</sup> and that a way to develop measures for IS knowledge and skill is to define

constructs based upon specific theories. Six related knowledge and skill areas are defined. Shi’s major hypothesis is that IS is young with multidisciplinary origins and its skills are ever changing as the discipline continues to grow.<sup>11</sup>

How do we arrive at a definition of skills? Michael Gallivan et al. examined patterns of IT skill sets from 1988 to 2003 via a content analysis of classified advertisements to determine what the most pronounced trends in positions and required skill sets are for IT professionals.<sup>12</sup> Their article cited the use of print ads found in *Computerworld* and the *Atlanta Journal Constitution* and provided a discussion of difference between online ads and print ads. Among their findings, they concluded that the number of IT career opportunities was increasing. The types of ads were changing—job skills were no longer clearly matched to job titles. Ads were more generalized and did not specify particular skills unless focused on a single position. Job titles change along with the technology. A summary of skill categories was developed, and details of skills within categories were tracked indicating an increased demand for nontechnical skills such as leadership, communication, and interpersonal skills. They concluded that more research is needed and that their study provided a method for following technology job advertising trends. Changes in demand patterns for IT professionals can be documented and demonstrate the need for IT professionals and academics to keep abreast of these trends.<sup>13</sup>

The one thing that is constant in information systems and information technology is change—change in technology, in business environments, and in the role of IS. The study by Dennis Lee et al. examines the impact of changing industry requirements upon the skills and knowledge areas of information systems (IS) professionals and relates these requirements to academic preparation. Their study was conducted in phases. The first phase used open forums and focus groups and ended with a questionnaire to industry managers

and leaders. Skill sets were not defined; the questionnaire was a means of determining them. Their findings indicated that industry demands IS professionals with a wide breadth of knowledge and skills in technology, business operations, management, and interpersonal relations. Their contentions are that lower-level IS jobs are disappearing and multidimensional skills are in demand. These factors raise questions concerning the IS curriculum and its effectiveness.<sup>14</sup>

How then can the curriculum be made more effective? Jeffrey Landry et al. state that curricula must balance tradition and innovation. One approach to this balance is finding common threads in knowledge areas. Once again the theme is change and variations of IT. Existing programs were surveyed and participants were asked to indicate how much understanding was required for each of thirty knowledge areas. Common knowledge areas were identified. Concluding remarks indicated that knowledge areas differ among existing programs. The common knowledge areas could help move IT toward a unique identity while building on traditional knowledge and practice of the computing discipline.<sup>15</sup>

The ultimate measure of a curriculum's effectiveness is the competence of its graduates. The study by Paul Kovacs et al. attempted to identify competencies for the IT workforce. They noted a strong relationship between the IT profession and the academic community due to rapid growth of information technology (IT) and academic programs offered in computing. IT professionals were surveyed for the competencies needed for entry-level and established IT professionals. The competencies found were professional (nontechnical), database, software development, systems architecture, systems development, Web and multimedia, management, and IT fundamentals. It was concluded that professional competencies were important and ranked most critical for both new hires and current employees.<sup>16</sup>

In 2006 Kovacs used a survey based on input from the Association of Information

Technology Professionals (AITP) and Corporate Education Career Services, along with a literature review, to define a skill set for information technology professionals. It consisted of six skills: programming languages, Web development, network administration, personal productivity software, project management, and systems development. Examples of the skills were provided, but no definitions were given.<sup>17</sup> The skills used in our study are derived from Kovacs, the major difference being the replacement of "personal productivity software" (essentially a universal job requirement) with "systems applications." The objectives of our study were: (1) to see if employers currently require or prefer that librarians have IT skill sets, and if so, (2) what is the skill set most in demand and how do the others rank?

Previous content analysis studies have provided evidence that librarians are frequently required to acquire skill sets outside traditional boundaries. However, none of these studies has examined the presence of skill sets defined by information technology in library position announcements. As yet, there is no standardized definition of information technology skill sets. This study develops and defines information technology skill sets that can be recognized by librarians and information systems technology professionals and contends that these skills can be readily identified in job announcements. Our study does not compare the skills we identified with those identified in previous studies.

### **Methodology**

All job ads requiring an MLIS or its equivalent (906 in total) were collected from ALA's online JobList from October 1, 2007, to March 22, 2008. Unfortunately, the ads on the job list are only available for sixty days and are not archived. When considering our sampling frame, we weighed the cost of data collection against the potential bias introduced by taking a convenience sample. Certainly there are always limitations to using a convenience

sample; however, to the degree to which changes in trends in job ads occur relatively smoothly without sudden fluctuations, we concluded that the chosen time frame and sample (MLIS) is representative of the current population of job ads. Job ads with an administrative focus, such as deans and directors, were excluded from the sample. Administrative job listings were found to be highly generalized and thus did not contain specific tasks and were primarily budgetary, leadership, supervisory, and/or public relations in nature. Also excluded were ads that provided only a link for a more detailed job description. After these exclusions, the number of usable ads was 620, of which one hundred ads were randomly selected for analysis. The text copy describing job duties or responsibilities, experience, and requirements were extracted from each ad as a single unit for analysis. Titles such as electronic access librarian or technology librarian were omitted.

Four coders—two librarians and two computer and information systems professors—were chosen to code the ads. The information systems professors were chosen for their expertise in IS curriculum development and assessment and job skills. The librarians were chosen for their expertise in “traditional” library skills and their knowledge of evolving trends in librarianship. The authors coded a sample of ten test ads to verify the clarity of the coding instructions and to determine approximately how much time coding would take. It took roughly ten minutes per ad.

Only one hundred ads (from the 620) were sampled for analysis due to the time-consuming nature of the coding process and the relative density of the job ad prose. To allow the coders to complete the analysis in one uninterrupted sitting without inducing fatigue, the time frame required and the number of job ads analyzed was limited. Each of the coders worked with a total of forty ads, of which twenty ads were common to all coders and twenty were unique. In this way, twenty ads were coded by all four coders and the remain-

ing eighty ads were distributed randomly among the four coders.

A pilot study was conducted to evaluate the clarity of coding instructions and IS skill set definitions. In the coding instructions, the coder’s job was described as reading a series of librarian job ads and coding each ad for the presence of one or more of the six IT job skills. Coders were informed that the coding results of all coders would be aggregated for statistical analysis, all responses would be kept in strict confidence, and coders were not being evaluated. The time commitment was estimated to be one hour. Coders were given background information about the American Library Association and the JobLIST.

In giving guidance on the decision-making process, it was made clear to the coders that this was not a keyword-matching exercise; that, where possible, the coder should “read between the lines” and resolve the inherent ambiguities of job ad prose. Coders were instructed to rely on their personal and professional judgment in evaluating the advertisements. An excerpt from the coding instructions is given below. The entire coding package is available from the authors upon request.

#### Instructions for coding job ads:

You will be coding excerpts of job ads containing a combination of job duties, requirements, and preferred skills. Code all job ads in one sitting. If you are unavoidably interrupted, please continue to code the remaining ads and make a note of this when returning the materials to the researcher.

1. Thoroughly read the job ad.
2. Place an “x” in the box next to an IT job skill if you believe the ad indicates the skill is required or desired of an applicant.
3. Review your codes and revise if desired.
4. Read the next job ad and repeat until all ads have been coded.

#### IT job skills:

- Programming Languages

- Networking
- Web Development
- Project Management
- Systems Development
- Systems Applications
- None

The pilot study consisted of ten purposefully selected ads from the 620 ads. Five of these ads contained only “traditional” library skills; the other five contained both IT and librarian skills. (See tables 1 and 2 for the skill sets used in this study.) The job ads used in the pilot were excluded from the final content analysis. In the pilot study, the coding instructions and ads were given to information science graduate students enrolled in a course on research methodology. They reported no difficulties in understanding the instructions. The authors coded the pilot study ads and calculated Scott’s Pi. Reasonable agreement was found for identifying Web development and networking skills. Lack of agreement in the other categories necessitated a refinement of definitions.

In the final study the four coders were told to read the coding instructions, to complete the ads from the pilot study, and then to compare their codings to the key provided before coding ads in the final study. The answer key provided the “correct” coding along with explanations for

the coding decisions. Each of the IT skills was coded and computed independently. A job ad could be coded as referring to none, one, two, or up to all six IT skills. Multiple references to an IT skill within a single job ad were only counted once. A job ad was counted as having a reference if at least one coder so classified that ad.

To assess the reliability of the coders’ analyses, Scott’s Pi was calculated on twenty cross-coded job ads. On this subset of ads, there was reasonable to excellent agreement on the four most commonly coded IT skills. For example, for Web development and systems applications, our coders agreed nearly eighty percent of the time.

**Discussion**

Our findings suggest a significant intersection between the skill sets of librarians and the skill sets of IT professionals. Seventy-two percent of job ads contained at least 1 IT skill. Thirty-eight percent of the job ads referred to a requirement for Web development skills. As can be seen in Figure 1, at least 24 percent of all ads indicated a requirement for skills in Web development, project management, systems development, or systems applications. If the comparative frequency of IT skills in librarian job ads is a measure of magni-

**TABLE 1**  
**IT Skill Sets**

Skill Set	Definition/Example
Programming Languages	Visual Basic, Java, C#, C, C++, SQL, etc.
Networking	LAN Administration, Network Design, Network Security, and Network Management
Web Development	HTML/XML, FrontPage, Dreamweaver, authoring Web pages, maintaining Web sites, Web 2.0
Project Management	Managing IT projects, production scheduling, and supervising personnel
Systems Development	Systems design and analysis, object modeling/UML, CASE Tools, database creation
Systems Applications	Installation of software, upgrading software, maintenance, installation and troubleshooting of hardware, performing system maintenance and backups

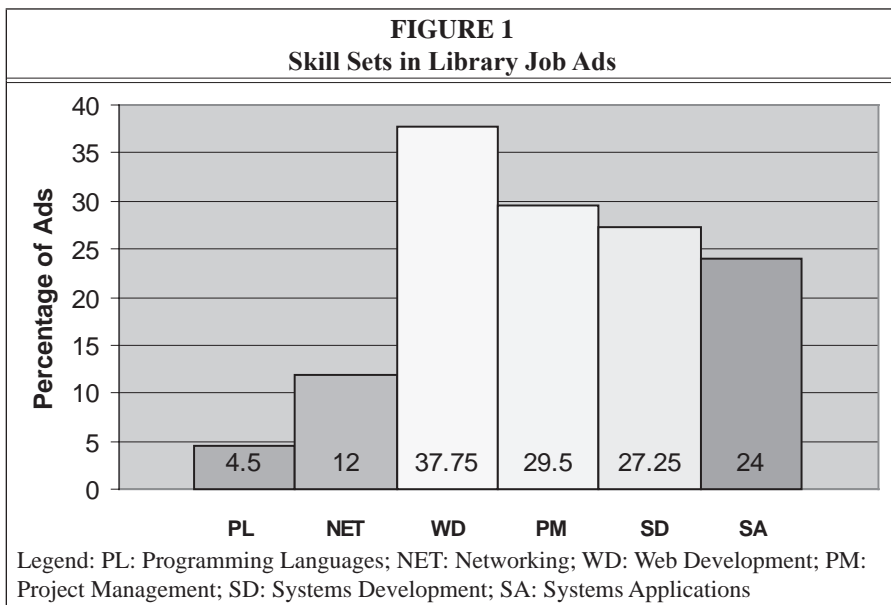
TABLE 2 Librarian Skill Sets	
Skill Sets	Definition/Example
Cataloging	Dublin Core, MARC, MESH, LCSH, Authority knowledge, AACR2, OCLC Connexion, Dewey classification, and Metadata
Serials	Electronic resource management, binding, and vendor relations
Acquisitions	Collection development, vendor relations, and budgeting
Public Services	Reference, interlibrary loan, bibliographic instruction, and circulation

tude or importance, then this intersection is substantial. Undoubtedly, librarians have been early adopters of technology. Technology has greatly increased our ability to provide services to our patrons. Our study confirms that these skill sets are evolving along with that technology. Employers most frequently requested that Web development skills be a part of a librarian’s knowledge base. One explanation is that as patrons increasingly seek information using Web technologies without the direct aid of librarians, librarians must also increasingly become more proficient at designing, implementing, and supporting Web technologies. A substantial number of ads also requested skills in project management, systems

development, and system application skills. Programming languages were not in high demand by employers. In fact, only four job ads required programming languages. These data also suggest that employers are seeking a wider range of IT skills. Over half (57%) of the ads requiring one IT skill asked for at least one more. In summary, this study shows that employers do want librarians to possess IT skill sets and that librarians and IS professionals can identify IT skill sets.

**Conclusions**

One conclusion of this study is a clear indication that, as technology has changed, so too have the skill sets required of librarians. As IT continues to pervade how patrons ac-



cess and utilize library resources, librarians continue to look more like IT professionals. That is, skill sets are changing in response to patron needs and culture. Librarians are faced with the question of what kind of skill sets are needed to provide services to patrons? Are traditional skills of organizing and providing access to information still valid? The answer is a resounding yes. In fact the traditional category of cataloging is effectively database management (a core IT skill). However the tools and skills sets for organizing and accessing information are changing dramatically. Librarians are changing in order to provide information services and these skills are incorporating IT skills.

This change raises many questions for the library profession. How are librarians to acquire these skills? Since these are skills of another profession, should they

collaborate? Should they teach themselves the necessary skills? Or should librarians stick to their traditional roles and parcel out the technology side by hiring more IT people? The answers are still evolving and more studies are required. Librarians need to examine what skills are necessary in the age of technology and information and focus their energies on ensuring that they continue to give excellent services that meet their patrons' needs.

An additional value of this study is that its methodology can be easily replicated and adapted for future studies. The IT skill sets and coding instructions are explicitly defined. A limitation of this study is the cross-sectional nature of the data collection. What is needed to identify long-term trends is a longitudinal study or a series of cross-sectional studies based on a common coding scheme.

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### Notes

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