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# Comparisons of information technology education in MLIS programs

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## Abstract

Given the increasing importance of technology in library and information science (LIS), new graduates' proficiency with technology is likely an important factor affecting their ability to find satisfactory work. This article investigates technology skills required by library jobs and compares them to LIS educational standards and practices. A review of LIS curricula reveals that several programs require little or no technological skill. Nothing in the accreditation process seems likely to change this situation, despite prevalent commentary that change is required. The literature on technological competency required by job openings is then reviewed, which results in recommendations that students tailor their educational experiences to their specific career goals and focus on adaptability and LIS fundamentals to increase the likelihood of a successful job search. It is then recommended that associations, schools, and researchers in LIS work to provide more robust curricula, curricular recommendations, and data on which to base such recommendations.

## Introduction

One of the most pervasive themes that strikes a student entering library and information science (LIS) is the impact of technology on the way library jobs are performed and how they will be defined. Introductory texts are peppered with statements like "the scope and rapidity of change within our profession has never been as great as it is now" ([Rubin, 2004, p. xi](#)) and "the growth of electronic information technologies has challenged [the role of libraries] and resulted in considerable instability and uncertainty among librarians" ([Rubin, 2004, p. 79](#)). The cover of *American Libraries* features headlines like "The Elusive E-Book" and "Game Design & Media Literacy," and LIS schools talk about their role in "today's ever-changing information and library science landscape" ([University of North Carolina \[UNC\], 2004e](#)) and how "professionals in the field are in a unique position to bridge the gaps that all too frequently exist between people, information, and technology" ([University of Washington, 2008c](#)). At the same time, discourse in the profession reflects concern over the continued relevance of the master's degree in LIS for work in libraries ([Berry, 2003](#); [Campbell, 1993, pp. 562-564](#)) and the difficulties of recent graduates in finding good entry-level jobs ([Holt & Strock, 2005, 2007](#); [Pergrand, 2006](#)). Considering the increasing importance of information technology in conjunction with the competitive job market, it seems unavoidable that candidates' proficiency with information technology is an important factor affecting their ability to find satisfactory work. This article will attempt to address the issues of what technology skills are required by present and future library job markets and how well current LIS graduates are prepared. First, it will discuss what level of technological skill is recommended by curricular standards, what level of skill is actually required by particular educational programs, and what changes have been recommended in the literature of the profession. Then it will consider the level of

competency required by job openings based on existing data. Finally, it will make recommendations for what organizations, schools, researchers, and students can do to ensure that LIS graduates are getting the technology skills they need in their education.

## Curriculum Standards

Given its role as accreditor for all master's-level LIS programs in the United States and Canada, the American Library Association (ALA) seems like it would be ideally situated to propagate standards for levels of knowledge and experience with technology for new librarians. However, no such standards exist. The ALA recently adopted new Standards for Accreditation of Master's Programs in Library and Information Studies (ALA, 2008). The last version of the standards was from 1992 (ALA, 1992). Like the 1992 standards, the 2008 standards have little to say about technology and require only that a curriculum "is concerned with recordable information and knowledge, and the services and technologies to facilitate their management and use"; that it "integrates the theory, application, and use of technology"; and that it "responds to the needs of a rapidly changing technological and global society" (ALA, 2008). While these are valid requirements, they provide little guidance for schools and professors trying to determine course content.

Although accreditation standards are currently the closest thing to enforceable rules of LIS education, they may be intrinsically ill-suited for the job of technology standards setter. By the terms of their own introduction, they are "indicative, not prescriptive" (ALA, 2008, p. 4). LIS programs vary widely in their design and curricula, as they should: different schools experimenting with different innovative approaches to their curricula is the best way we have, right now, of improving LIS technology education. Equally excellent programs may be very differently designed, and the accreditation standards need to be flexible enough to evaluate all of them. The standards also address more than the curricula itself, with criteria for such diverse aspects of a program as its goals and objectives, faculty, students, administration, and facilities.

The ALA can affect LIS education in ways other than accreditation standards, however. For example, there is a set of draft core competencies that were compiled in response to the recommendation of the ALA's 1999 Congress on Professional Education. The most recent draft of the core competencies from 2005 does include "Technological Knowledge" as one of the eight competency areas, but the competencies are not much more specific than the standards. One of the competencies states, for example, that a newly graduated student from an accredited program should demonstrate "a comprehension of current information and communication technologies, and other related technologies, as they affect the resources and uses of libraries and other types of information providing entities" and "proficiency in the use of standard information and communication technology and tools consistent with prevailing service norms and professional applications" (ALA, 2005, p. 2). This poses the question, "What are 'standard information and communication technology and tools' today?" But it does not answer it.

The biggest problem with using the standards or the core competencies to guide technology education in LIS is that the ALA is a huge bureaucracy, and effecting change in official policy is slow: 16 years from the last round of standards to the current one, 9 years and counting for the adoption of core competencies. Technology's role in libraries changes much more quickly than that, and specific technologies come and go even faster.

The ALA is not the only possible source for such guidelines, although its accreditation activities may make it seem a natural one. The International Federation of Library Associations and Institutions (IFLA) has also adopted curriculum guidelines, but they are similar to ALA's standards in their lack of specificity and currency. The IFLA Guidelines for Professional Library/Information Education Programs list 10 core elements for a curriculum, including "Applications of Information and Communication Technologies to

Library and Information Products and Services” (IFLA, 2000). IFLA’s guidelines do not contain any other recommendations for technology education for librarians.

The Special Libraries Association (SLA) has its own guidelines. The SLA Competencies for Information Professionals are from 2003 and do not go so far as to recommend many particular skills, but they do demonstrate that it is possible to be a bit more specific while still remaining relevant for multiple years (SLA, 2003). For example, SLA Competency D.2 states that an information professional “applies expertise in databases, indexing, metadata, and information analysis and synthesis to improve information retrieval and use in the organization” (SLA, 2003). Perhaps they could be even more specific if they were revised more often, but even if they were, it is unclear what effect they would have. The SLA is an organization primarily made up of corporate, academic, and government information specialists, so its recommendations may be less useful for others, like public or school librarians, and the SLA has no role in the accreditation process.

Currently, the determination of what technology skills schools should require is left to the schools themselves. The next section will examine what knowledge ALA-accredited programs have chosen to offer to and require of their students.

## Current Curricular Practices

LIS programs are incorporating more technology into their course offerings and into the infrastructure of the programs themselves. “Investment and infusion of technology” into LIS curricula was one of the six major trends in curricular change identified by the KALIPER Report in its 2000 study of library curricula (KALIPER Advisory Committee, 2000, p. 6). Schools vary widely, however, in what skills are taught and whether those skills are taught in required courses or electives.

Markey (2004) surveyed online course descriptions of 54 ALA-accredited LIS programs and found that 21 schools had required courses in information technology (IT) and that IT was the 6th most popular subject area (out of 11) for required courses to cover. “A typical set of core courses consisted of five courses, one in each of the following categories: Organization, Reference, Foundations, and Management, and one either Research or IT” (p. 325). Most IT courses were offered as electives rather than requirements and covered everything from “library automation, technical services, database management, system design, and general surveys of information technologies” (p. 326). Markey found that the number and variety of IT course offerings had continued to increase since an earlier study in 2001. While IT appeared to be “the driving force behind the development and enhancement of ILS [information and library science] programs,” this was no longer the case in 2004 (p. 319).

Similarly, Tenopir (2002, p. 12) found that core curricula were built around information resources, information management, information access, information systems and technology, research, and information policy but still focused mainly on the first three.

McKinney (2006) determined that all 56 ALA-accredited programs offered courses addressing the ALA’s draft core competency of Technological Knowledge. Thirty-seven of the programs met the competency with a required course. This means that at 19 accredited schools, by McKinney’s reckoning, a person could graduate with a master’s in LIS without taking a course that requires “proficiency in the use of standard information and communication technology and tools consistent with prevailing service norms and professional applications.”

But what was actually required by the courses McKinney (2006) described as meeting the technology competency? Direct examination of the schools’ course catalogs indicates that the level of skills being taught in the required courses may in fact be fairly low, although a wide and sophisticated range of things is being taught in elective courses. Describing the technology competency required by each of the 56 programs would be a long article in and of itself, and not necessarily an interesting one. Instead, the

programs at four schools—the University of Illinois, UNC, Syracuse University, and the University of Washington—have been used as a sample. These schools were chosen based on their placement at the top of U.S. News & World Report’s rankings of best graduate schools in library and information studies in 2006. ([U.S. News, 2006](#)). While some may object to the practice of ranking schools or U.S. News & World Report’s methodology in particular, it does not seem controversial to say that these are examples of good LIS schools. The level of LIS education they provide, technological and otherwise, should be average or better. In addition, the mere fact that they have been spotlighted by these rankings will increase the attention paid to these schools and the likelihood that their practices will be emulated by other programs.

Illinois’ Graduate School of Library and Information Science has only two required courses in its master’s degree program, neither of which is an information technology course. Numerous electives in a few of the school’s seven curriculum “clusters” do offer technology training, should students wish to pursue it. A few examples are “Digital Libraries,” “Document Processing” (an “introduction to XML-based document processing technologies and standards appropriate to electronic publishing”), and “Introduction to Network Information Systems” (which includes “choosing, installing, and managing computer hardware and operating systems” and creating a “working network environment”; [University of Illinois, n.d.](#)).

The School of Information and Library Science at UNC offers a master of science in information science and a master of science in library science ([UNC, 2004d](#)). Both have an information technology requirement that is fulfilled by completion of a course called “Information Tools” ([UNC, 2004b, 2004c](#)). The course description reads: “Tools and concepts for information use. Information literacy, microcomputer software use and maintenance, microcomputer applications, and networked information systems” ([UNC, 2004a](#)). Which applications and systems are taught in the course is not explained, but evidently they are not very advanced because a student with “demonstrated expertise in basic computing skills [italics added] may exempt [the] course” ([UNC, 2004b](#)). UNC’s elective options are much more involved, with courses like “Database Systems” and “Non-Numeric Programming for Information Systems Applications,” where students can learn MySQL, XML, and other technologies.

Syracuse’s Master of Science in Library and Information Science Program has nine required courses, none of which has an obvious technology component, although the school’s Web site states that one of the three themes running throughout its courses is “appropriate and effective use of information technologies” ([Syracuse University School of Information Studies, n.d.](#)). Of the required courses, those that look most likely to touch on information technologies are “Reference and Information Literacy Services,” which includes “the discovery and use of print and electronic resources,” and “Information Resources: Organization and Access,” which is described as an “introduction to theories, tools, and standards for information organization and access, including . . . fundamentals of information retrieval systems” ([Syracuse University, n.d.](#)). The elective courses, like at Illinois and UNC, include more specific and comprehensive technological offerings. Examples include “Information Technologies in Educational Organizations,” “Security in Networked Environments,” and “Broadband Wireless Network Technologies” ([Syracuse University, n.d.](#)).

As of August 2008, all students enrolling in the University of Washington’s master’s-level LIS program will have to complete an IT core course ([University of Washington, 2008b](#)). Students can choose which course to take, but all of the options appear to provide real IT training. For now, the options include information retrieval, XML, conceptual database design, and network system administration, and the school anticipates adding more in future years ([University of Washington, 2008a, p. 2](#)). Presumably, students could take additional courses from this list as electives, and the school plans on offering more advanced electives in the area of technology as well ([University of Washington, 2008a, p. 2](#)).

Out of these four highly ranked programs, only Washington has more than a minimal technology

competency requirement. As noted above, McKinney (2006) found that 37 of 56 ALA-accredited programs had required courses that met the draft core competency of Technological Knowledge but included in this figure were requirements like UNC's "Information Tools" course that can be opted out of by demonstrating basic computer skills and Syracuse's "Survey of Telecommunications and Information Policy" course, which Syracuse's course catalog describes as covering "public policy issues of the digital environment" (Syracuse University, n.d.) but not actual use of that environment's tools (McKinney, 2006, Appendix B). Browsing the Web sites of several other accredited programs shows that these four schools are not atypical in their requirements and that the bar for required technology skills is fairly low for a master's degree in LIS.

This does not necessarily mean that all or most LIS graduates lack technology skills, but it does demonstrate that an accredited degree does not guarantee those skills. Before turning to how big a cause for concern this is for the field that will soon be employing these graduates and the future employees themselves, it is interesting to briefly review what some of the existing literature says about an ideal or at least improved curriculum for technology.

## **Calls for Curricular Change**

Literature in the profession has been calling for change in curricula and curricular standards to meet the needs of developing technology for years. For example, Campbell (1993) argued that "a smattering of computer courses is simply not sufficient," that "librarians need deep technical proficiency," and that "we must rethink library education" (p. 564)—and that was 15 years ago. Campbell also called for reconsideration of certification for professional librarians. He envisioned that such certification would "establish appropriate levels of proficiency in information technology; require proficiency testing; [and] define minimal requirements for continuing technical education" (p. 564). Campbell addressed the ALA's role as well, writing that "accrediting agencies must bless, even encourage, new directions and experiments in library education, such as affiliations with departments of engineering or computer science" (p. 564).

When addressing the ALA's Congress on Professional Education nearly 10 years ago, Bates (1999) argued that "we do have to have a better understanding of the information technology than library education has typically afforded. . . . As a rule, that segment of library education needs to be strengthened (¶ 25).

Myburgh (2003) considered the necessity of IT training to be self evident and wrote that "there is no denying that today's graduates need to be fluent in information systems and technologies of all kinds" (p. 223). To address this need, she argued that LIS programs should place "more emphasis on data and information structuring and the design of information structuring and the design of information systems" (p. 224).

As discussed above, Markey (2004) found that IT was no longer the main driving force in program development, and she considered this to be a good thing. "While information technology will remain an important component of the ILS curriculum, any ILS claim to information technology should be centered on the ability to make people more efficient and effective in their search for information." Because other disciplines consider IT their forte, "it doesn't make sense for ILS to claim IT in its entirety because it is so vast and much of it lies on the periphery of ILS" (pp. 332-334). Certainly it would not make sense for LIS to attempt to claim all of IT, but that does not mean that there are not some technologies that LIS would benefit from taking leadership roles in, or that information professionals couldn't or shouldn't be just as comfortable with technology as their colleagues in information science or computer science. Markey recommended that schools ensure their programs were current and relevant by retraining faculty, adding new concentrations, and considering joint degree programs.

Malhan and Rao (2006) also advocated continuing education for professors, as well as adding courses on digital libraries. Malhan and Rao argued that if LIS programs were to meet the need of today's networked information environment, core curricula should include "courses such as Information Technology Applications, Internet Resources Based Services, and Library and Information Centre Management" (p. 82). A library professional, according to Malhan and Rao, "should have knowledge of database development," be able to "handl[e] familiar library software packages, able to create dynamic web pages and collect information fragments and documents on the Internet and aggregate them into the virtual library resources of the institution" (p. 82).

## **IT Skills Required by the Current Library Job Market**

While the specific recommendations vary, all of the above authors have recognized the importance of solid technology education to a modern LIS program. This section will investigate what that education would ideally include, as indicated by the skills required by the positions the graduates of those programs are being educated to fill.

The KALIPER Report cited demands of employers as one factor leading to curricular changes (KALIPER Advisory Committee, 2000, p. 8). Employers are demanding increasing levels of IT skills because, as Lynch and Smith (2001) observed, "the field has incorporated computing technologies into all jobs" (p. 417). If LIS graduates do not have the requisite skills, libraries will need to resort to short-term strategies such as hiring "people with science and engineering degrees or technology qualifications" in order to ensure they have qualified staff (Berry, 2003, p. 35). Employers and students alike now expect that "graduate library education will include the mastery of technical competencies supported through the incorporation of computer-dependent technologies into the teaching and learning environment" (Hall-Ellis, 2006, p. 40). Commentators differ, however, on whether existing LIS programs are producing sufficiently skilled students.

Lynch and Smith (2001) analyzed 25 years of job advertisements in College & Research Libraries. They found that although as a rule all jobs required computing skills, the later advertisements (those from the 1990s) stated the requirements in broad terms, rather than the specific skills that appeared in the advertisements of earlier years. They interpreted this to mean that "the assumption of employers seems to be that a graduate's knowledge base will include knowledge of computer technologies as they relate to library and information science" (p. 417) and that "educational programs are doing well in providing students the grounding in technical matters now routine in academic library operations" (p. 418). Lynch and Smith reasoned that employers would likely make this assumption because an ALA-accredited degree was an accepted job requirement and that based on the ALA's standards, "computer skills, a solid knowledge of technological design and application, and knowledge of information resources in all formats must be integral components of educational programs in LIS" (p. 417). This is a possible explanation but hardly the only one. Perhaps employers assume that new hires will learn applicable technologies on the job, or they are screening for technical knowledge at a later stage in the application process than the job advertisement, or the applicants generally do have the desired computer skills but are acquiring them in other aspects of their lives than their educational programs, like prior library jobs. In any case, employers were not actually asked about the reasons behind the contents of their job advertisements, and other authors have found the opposite of Lynch and Smith: that employers' needs were not necessarily being met by LIS education in areas of technology.

Hall-Ellis (2006), for example, found that at least as far as cataloging was concerned, "the number of . . . courses and curricular coverage do not meet employers' expectations" (p. 41). Hall-Ellis wrote that "members of the cataloging community continue to identify and articulate technical skills and competencies for novices and experienced catalogers" (p. 49) and that a "growing trend among employers

is the inclusion of specific coursework requirements in job announcements for entry-level catalog librarians” (p. 44).

Technical services is another specialty where at least one author has found that LIS education was not meeting employers’ needs. Fessler (2007) reported that a review of the course catalogs of ALA-accredited programs revealed that they did not match up with the competencies required by listings for postings at the Fairfax County Public Library, Fessler’s home institution. Fessler found that “while all library schools had courses or topical coverage for competencies required before the advent of the Internet, most did not address the needs emerging for libraries to integrate technological advances and respond to economic and social changes” (p. 143), like copyright in digital resources.

Fessler (2007) argued that three key changes were occurring in libraries, and in technical services in particular, that were substantial enough to require new skill sets. The first was that “‘packages (or containers) of information’ are increasingly not fixed, but are often digitally born, stored, transferred, modified, and accessed in evolving media formats” (p. 141). The second was that “the definition of ‘acquire’ has also evolved far beyond purchasing, subscribing, and licensing. Acquisition activities now include—and in the future will increasingly include—issues of rights management” (p. 141). Because of this, she reasoned, “the understanding of rights in newer information and communication formats is murky” (p. 141). The third development, according to Fessler, was that organizing “is no longer limited to cataloging and processing in the traditional sense. . . . Total reexamination of the structure, relationships, and definitions for records and the entities they describe need . . . to be undertaken” (p. 142). Fessler proposed that one way to make sure that future LIS graduates are prepared to deal with these practical issues is “adoption of a healthcare education model” (p. 144), meaning the joining of theory and practice through things like internships as part of LIS education. In this way, students would gain first-hand knowledge of exactly what types of technology were being used in their projected work environments. She observed that “most library schools do have practicum opportunities” in place already (p. 144). Unlike the medical professions, however, in most LIS programs practical experiences are optional rather than required.

Marion, Kennan, Willard, and Wilson (2005) analyzed job advertisements on the Drexel University job posting Web site over an 8-week period in 2004 by tabulating various keywords that occurred in the ads in an attempt to determine what “technical skills, LIS knowledge and competencies and behavioral characteristics” employers sought (p. 5). This study was not targeted towards any specialty. Based on a cluster analysis of which terms occurred together in the advertisements, they determined that there was a “core” of 10 categories. Three of these core 10 were technology-related: Technical Services, which was the 2nd-most occurring category; E-Resources, which ranked 5th; and Web Design and Maintenance, which ranked 7th (p. 9). The more IT-heavy categories of Generic IT Skills and Programming Languages were less common, ranking 11th and 15th, respectively. Based on the data of Marion et al., it would appear that while most library jobs do require technology skills, they are not likely to require specific advanced ones.

Marion et al. (2005) also noticed a cluster of Web Design and Maintenance and Generic IT skills in their Australian data and observed that “basic web-related skills, such as designing and maintaining a web page, are rapidly becoming part of the standard toolkit for many librarians, similar to knowing a word processing program” (p. 12).

Other authors have studied what employees themselves felt about their technical skill level. In a survey of 46 digital librarians by Choi and Rasmussen (2006), a majority of respondents who were asked what aspects of digital librarianship for which they felt least prepared cited skills related to technical aspects of their jobs. When asked which of 23 skills and types of knowledge were needed for their jobs, the respondents ranked communication and interpersonal skills highest, followed by project management and



leadership skills. The highest ranked technology skill, digital library architecture and software, tied for third. Technical and quality standards and Web markup languages were the next most common in the technology category, ranking sixth and seventh, respectively. Even among digital librarians, then, specific advanced technical skills were not considered the most important ones, but they were the ones for which respondents felt they should have had more training.

As for the librarian of the future, Feret and Marcinek (2005) found that IT skills were the most important characteristics in both the librarian of 2005 and the predicted librarian of 2015, followed closely by communication and training skills. Their findings were based on a survey of 33 experts in 20 countries. A similar survey conducted by the authors in 1999 about the librarian of 2005 had found the same thing.

## Discussion and Recommendations

Quality IT education for LIS is crucial, and ensuring that it is what it needs to be will require the participation of professional associations, employers, teachers, schools, and students themselves. That much is clear. Exactly what to do is not, due to both the size of the issue and the fact that both the answers and the questions change just as technology does. An attempt is made below to suggest some steps in the right direction.

### *For Students*

Students trying to pick a school or plan a curriculum are the most directly and personally affected by these issues because their careers are potentially on the line. What can they do to ensure that they possess these crucial IT skills, and how do they know which IT skills are the most important ones? Based on the most current data available in the field, three strategies emerge:

Tailor education to a desired job as much as is feasible. Disagreement about the adequacy of current education in preparing a person for a successful career is plentiful, and it varies depending on the specialty involved. Given the incredible variability among schools' requirements and electives, the sufficiency of individuals' LIS educations will also vary depending upon their particular institutions. Students cannot just assume that meeting the program's requirements guarantees that they have the technology background they will need on the job. The good news, according to Gordon (2006), is that new young librarians are often perceived as being technologically savvy whether they are or not and may be more savvy than they realize. "Growing up with technology affects NextGens' perspective on and comfort with its use. While technical skills are by no means unique to younger librarians, the way they integrate technology into their lives, in general, often differs [from their older colleagues]" (Gordon, 2006, p. 37). Although all library positions require more IT proficiency than they used to, the specialties most heavily affected by the technology changes of recent decades, such as cataloging, technical services, and work in digital libraries, require even more than the average library career. The best and possibly only way for LIS graduates to make sure they are qualified for their ideal jobs is to determine what that ideal career is as early as possible and research its specific requirements by perusing job postings early and often. Completing an internship in a chosen field or environment is another way to become familiar with what a job really requires. If a job's requirements seem to have wide variability or if one is not yet able to determine what an ideal career would be, a person can still focus on adaptability and fundamentals as discussed below.

Focus on adaptability rather than specific skills. No one starts a job knowing everything. Many experienced librarians have jobs today that their LIS degrees alone did not prepare them for because many of the technologies being used today did not exist when they were in school. Grossman (2006) points out that "the skills I had to garner in my succession of jobs are being taught directly to those graduating from these information programs today" (p. 30), but that does not mean that on-the-job learning has ceased to exist. Hall-Ellis (2006), who wrote that courses and curricula were not meeting employer expectations for

catalogers, found that “education and training of novice catalogers continues in the early years of a professional career” (p. 45). In a blog post that garnered dozens of comments and was praised in *Information Outlook* (Lachance, 2006), the monthly magazine of the SLA, Farkas (2006) made a list of “skills for the 21st century librarian.” She wrote that although she started out by thinking of things like “HTML, network administration, PHP and MySQL,” she decided that the real need was for “the ‘big picture’ topics; how to really be able to keep up with technology, make good decisions about its implementation, use it and sell it to others” (¶3). She listed five basic competencies: “ability to embrace change, comfort in the online medium, ability to troubleshoot new technologies, ability to easily learn new technologies, and ability to keep up with new ideas in technology and librarianship (enthusiasm for learning)” (¶¶4-8). These are things that all current students should be able to learn in their LIS program (even if they are not required to) and would make it possible to learn specific technologies on the job as necessary. This is in line with data of Marion et al. (2005), discussed above, which suggested that library job requirements do include technology knowledge; advertisements are less likely to include specific advanced skills like particular programming languages. The important things appear to be to have some level of technology skill (particularly Internet skills, based on the most frequently appearing terms in Marion et al.’s core library skills categories) and to be able to see and explain how one’s specific skills are transferable.

Have solid fundamentals. Finally, it should be noted that no one has asserted that IT skills were the only important job skill, or even vastly the most important. Communication, management, and training skills were all found to be nearly, and usually more, important. Leonhardt (2007) notes that there is no evidence that LIS programs aren’t producing good librarians. He argues that “we have agreed, in practice, on what new librarians should know and it is pretty much what it was when we went to library school. It is the LIS curriculum as taught by each of the ALA accredited programs” (p. 5). Leonhardt writes that LIS programs on the whole are producing “useful, productive colleagues” (p. 5). Technological knowledge has become a fundamental requirement for LIS practitioners but not by replacing all other skills, and employers will continue to look for well-rounded applicants.

While this may be no more helpful than the ALA’s curriculum guidelines in answering the question, “Do I need to learn XML?” it should at least provide a framework for formulating and answering such questions, and is the best advice the author (a student herself) was able to assemble. Ideally, a multitude of other more experienced minds will lend their expertise in the not-too-distant future.

#### *For Associations*

Until the ALA can move more swiftly, it cannot set useful standards in this area. If some division or committee—the Committee on Accreditation, the Office for Information Technology Policy, and the Library & Information Technology Association are all good candidates—could find a way to issue a set of recommendations or requirements on an annual or biennial basis, it would be providing a valuable service for LIS education and continuing education. Such recommendations could be based on job requirement analysis, a survey of ALA members, or even just the firsthand knowledge of committee members with relevant backgrounds and experience. They might also prove useful when evaluating whether a program meets the accreditation standards’ requirements that a program “integrates the theory, application, and use of technology” and “responds to the needs of a rapidly changing technological and global society.” Unfortunately, there does not seem to be anything like this in the works.

Organizations like IFLA and SLA lack the ALA’s accreditation clout but could issue similar recommendations on an advisory basis. Nonbinding recommendations would not guarantee any particular level of technology proficiency was included in an accredited degree, but they could still be instrumental to schools trying to institute curricular change and would increase the likelihood that more students would be receiving the instruction for which potential employers are looking.

### *For Schools*

Many schools are already experimenting with innovative ways to make sure their students know what they need to know to succeed in their careers. For example, as discussed in the curricula section, the University of Washington's master's LIS program has a core curriculum requirement that offers flexibility while ensuring that students take at least one course that has a serious technological knowledge component ([University of Washington, 2008b](#)). The exit requirement in Syracuse's master's of science LIS program is usually fulfilled with an internship or cooperative education experience ([Syracuse University School of Information Studies, n.d.](#)).

Both of these approaches—required substantive technology courses and hands-on experiences of real work environment technologies through internships—should create a more tech-savvy crop of master's recipients than is currently being produced. Quality career counseling to encourage students to think critically about where they want to be after they finish the program and what they need to do to get there would also be valuable. Schools' most valuable resource in this area is their faculty, many of whom have direct knowledge of what skills (Web page building? network administration? database design?) are most useful in today's libraries.

### *For Future Attention*

Many questions remain open for researchers in the field interested in studying them. Much more data could be gathered from new empirical analysis of job openings. More current studies focusing on particular technologies and comparing different subfields would be extremely useful, as would a comprehensive analysis of entry-level positions. It would also be useful to consider the issue from the job searcher's perspective by investigating what correlations may exist between applicants' technological skills and education and the success of their job search, or the differences between job searches of fresh graduates and those of more experienced job applicants.

## **Conclusion**

Today's LIS students should be well-placed to enter the library job market if they tailor their educational experiences to their career goals, develop enough IT knowledge to be adaptable to new technology as it develops, and cultivate the fundamentals of their LIS educations. However, in a profession that claims to be on the cutting edge of technology with an existing accreditation scheme in place, they should not have to instigate a cumbersome investigation and mission on their own initiatives to do so, and they can't succeed if the learning opportunities are not there in the first place. More LIS programs should have a technology literacy component as part of their requirements and integrate information technologies into the infrastructure of their programs. Given today's technological landscape, they are doing their students and the profession a disservice by not doing so. Specific recommendations may prove to be impossible given the rate of technological change in the field, but the possibility should at least be investigated. If specific recommendations are impracticable, programs still need to have some requirement that gives their students technological adaptability and comfort with change so that they are able to be useful professionals in today's information environment.

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[Go to Top](#)