1994

Meeting the Educational Needs of Systems Librarians: A comparative Study of Schools of Information and Library Science, Graduate Schools of Business, and Undergraduate and Graduate Computer Science Programs

Laura Burtle
lburtle@gsu.edu

Laura Burtle. Meeting the Educational Needs of Systems Librarians: A Comparative Study of Schools of Information and Library Science, Graduate Schools of Business, and Undergraduate and Graduate Computer Science Programs. A Master's paper for the M.S. in L.S. degree. April, 1994. 23 pages. Advisor: Paul Solomon.

This study describes a content analysis of the course catalogs of top-ranked Schools of Information and Library Science, Graduate Schools of Business, and undergraduate and graduate Computer Science programs. The catalogs are analyzed in regard to the number of courses they offer that address the educational needs of aspiring systems librarians. These needs are derived from two previous studies of systems librarianship.

Schools of Information and Library Science and Graduate Schools of Business offer similar numbers of courses in most of the nine categories studied, although Business Schools do not offer courses in library specific technical services. Computer Science programs only offer courses in microcomputers, programming and networking. Few individual schools in any of the three disciplines offer courses in more than three of the nine categories.

Headings:

Education for librarianship

Systems librarians -- Education

INTRODUCTION

As a constantly evolving field within librarianship, systems librarianship is not definitively defined, and the requirements for employment in systems librarianship are unclear. It follows that the educational needs of aspiring systems librarians are also in question. The literature shows disagreement regarding the amount of technical knowledge that should be taught versus the need for training in more traditional librarianship.

Recently, two studies were done that explore the question of what skills are needed by a systems librarian. Suzanne M. White (1993) analyzed educational and skill requirements in advertisements for systems positions. Leonard (1993) reported the preliminary results of a survey conducted by the American Library Association's Library Administration and Management section. The survey asked current systems librarians what skills they judged necessary for a new systems librarian.

This research looks at course catalogs to determine whether the skills and knowledge identified by the White and Leonard studies are taught in Schools of Information and Library Science. Additionally, it looks at Schools of Business, and graduate and undergraduate Computer Science programs to determine if these disciplines teach skills needed by systems librarians.

LITERATURE REVIEW

Although there is less written on systems librarianship than on other library fields, there is sufficient literature discussing the skills required of a systems librarian for there to be disagreement. Some authors argue that a good knowledge of librarianship is more important than technical skills, while others stress the importance of technical knowledge.

There is general agreement with Felix Chu's (1990) description of the three primary responsibilities of a systems librarian. The first responsibility is to select an integrated system, and plan for it's installation. The second is the actual installation of the system. The third responsibility is the maintenance of the installed system, including ongoing analysis and efforts at improvement. Martin (1988) described the role of the systems librarian as to "identify the needs of the library for automated systems, cause these systems to be implemented, and analyze the operations of the library" (p. 57). Suzanne M. White's (1993) study of job descriptions in classified advertisements confirmed that this responsibility, described as Automation/Systems, is still the primary (53%) duty described in classified advertisements.

The systems librarian also has additional responsibilities. These may include the management of telecommunications, optical storage and retrieval, personal computer systems, local area networks, electronic data interchange, and distributed processing systems (Rowe, 1989, p. 106).

Which of these specific areas of technological knowledge should be taught in Master's of Library Science programs is an area of disagreement. McLain (1990) argues that systems librarians should have courses in advanced microcomputers, statistical inference, analysis of information systems, bibliographic control systems, and a practicum in library automation (p.11). Boyce and Heim (1988) assert that library systems analysts need considerable management ability to analyze and evaluate the

performance of current systems, knowledge of hardware and software to judge vendor claims and troubleshoot microcomputers and LANs, and the ability to diagnose and rectify automated system problems and communicate them to the vendor. Campbell (1993) states that "a smattering of computer courses is simply not sufficient. Increasingly, librarians need deep technical proficiency" (p. 564).

Alternately, a number of authors stress the need for a more general, less technical understanding. Malinconico (1989) asserts that "it is more advantageous for librarians to become conversant with modern technology's major trends rather than attempt to master the specific technical details of one or another technology" (p.142). Ridgeway and Gattone (1987) contend that a basic understanding of the systems analysis process, of database management, and of automation system management will provide a foundation for post-graduate individual development.

Curtis (1987) suggests that "a familiarity with basic terms and concepts of library automation provides the basis for further learning and also helps the librarian communicate with others involved in the implementation process" (p. 108). Rush (1987) concurs:

> "A librarian does not need to know how a computer system works in any great detail, but should nevertheless know how computer systems are organized and structured, how the various parts (both hardware and software) relate to each other, how the various parts relate to system performance, how malfunction or failure of each part affects the operation of the system as a whole, and what to do when such malfunction occurs" (p. 97).

White analyzed the requirements listed in job advertisements for systems/automation librarians. Her findings support the literature that argues for a substantial degree of technical training. While experience in planning, implementing, and managing automation projects was the most frequently listed skill or experience requirement (53%), microcomputer skills was the next most frequent requirement

(40%). Experience with Networking/LANs was required in 20% of the advertisements, CD-ROM technology in 11% and telecommunications in 11%. Other requirements included supervision/management, technical services, online databases, reference, mainframes, Internet, document delivery, interlibrary loan, user support, programming, software, training, and information technology.

The Library Administration and Management section of the American Library Association undertook a survey of existing systems librarians in 1991 (Leonard, 1993). Part of the survey asked systems librarians to rank a number of areas of knowledge on a scale of 1 to 5 as to their importance for a new systems librarian. The results of this survey reinforce those of the White study. Project management was considered the most important area of knowledge, followed by hardware (micros), library workflow , library policies and procedures, telecommunications, application software, local area networks, MARC formats, systems software, CD-ROM technology, systems operations, systems analysis, technical support, university policy and procedures, hardware (mainframes, minis), and programming.

METHODOLOGY

The course catalogs of the top ten Schools of Information and Library Science, Graduate Schools of Business, and graduate and undergraduate Computer Science programs were studied to determine whether these programs teach the skills and knowledge needed by systems librarians. The top ten schools were determined using national rankings respected in each field (Appendix A).

A limitation to the study is the timeliness of course catalogs. The most recent catalogs available were used, but most programs offer new courses before they are included in these catalogs.

A list of the skills and knowledge wanted in systems librarians was compiled from the White and Leonard studies. The list is composed of those skills and areas of knowledge found in both studies. These skills or knowledge categories are:

Automation/Project Management

Microcomputer/Hardware/Application software

Technical Services

Networking

Telecommunications

CD-ROM Technology

User Support

Mainframes/Minicomputers

Programming

To compile the statistics, the course catalog of each program was examined for courses that teach any of the above skills. The definition of a course meeting a requirement was adjusted according to the program. For example, in the Information and Library Science bulletins, Automation/Project Management courses related directly

to library automation, whereas in the Business School bulletins, courses addressed automation in general.

A number of instances arose where a course description indicated brief coverage of an area, but the primary focus of the course was elsewhere. In these cases, the partially relevant courses are noted by a P in the tables, but are not included in the calculation of the percentage of programs offering courses in the subjects.

RESULTS

The table *Percentage of Schools Offering Courses* (Fig. 1) shows that Schools of Information and Library Science and Business Schools offer similar numbers of courses in the skills and knowledge categories. Business Schools do not teach any Technical Services courses, while all Schools of Information and Library Science do. Twenty percent of Business Schools offer courses dealing with mainframe or mini-computers, while none are offered by Schools of Information and Library Science.

More Business Schools and Computer Science programs offer courses in Networking than do Schools of Information and Library Science. Not surprisingly, more Computer Science programs offer courses in Programming.

The table *Courses Offered by Schools of Information and Library Science* (Fig. 2) indicates that with the exception of Technical Services courses, no school offers more than two courses in any of the areas with the exception of 4 programming courses at Syracuse.

Sixty percent of the courses offered are in the area of Technical Services. Removing the Technical Services category leaves only 19 full classes among the ten Schools of Information and Library Science that address the remaining eight educational needs of systems librarians identified for this study.

The University of North Carolina at Chapel Hill offers the widest variety, with full courses in six of the areas. No other school offers full courses in more than three of the nine categories. Four of the schools only offer full courses in Technical Services.

The table *Courses Offered by Business Schools* (Fig. 3) shows a total of 23 relevant course offerings by the ten schools. This is a higher total number of courses than are offered by Schools of Information and Library Science. However, no single Business School offers courses in more than three of the nine areas.

The table *Courses Offered by Computer Science Graduate Programs* (Fig. 4) shows 17 relevant courses. The pertinent courses are concentrated in only two of the nine categories. Fifty-three percent are in Networking and 41 % are in Programming.

The table *Courses Offered by Computer Science Undergraduate Programs* (Fig. 5) indicates 42 courses among the nine skill categories. Sixty-seven percent of these courses are in Programming. The maximum number of categories in which any program offers courses is three.

DISCUSSION

The results of the study indicate that overall Schools of Information and Library Science provide courses in more of the required skills than Business Schools or Computer Science programs. In certain areas, however, Business Schools and Computer Science programs provide as many or more courses as Schools of Information and Library Science.

Automation/Project Management

Fifty percent of Schools of Information and Library Science and 40% of Business Schools provide education in this area. Business school courses were counted if they provide instruction in the selection, installation, maintenance and evaluation of any automated systems, while Information and Library Science courses focused primarily on automated library systems. Both the Suzanne M. White (1993) and Leonard (1993) studies listed this as the most important skill required of systems librarians.

Given its importance, the number of Information and Library Science programs offering instruction is low; only 50% offer a full course. Most do offer a class in systems analysis, which provides a basis, but alone is insufficient preparation for the task of managing an integrated library system.

Microcomputer/Hardware/Application Software

Information and Library Science, Business, and Computer Science all have programs that offer instruction in microcomputers. The courses tend to focus on software applications, but all cover at least the basics of microcomputer hardware. All of the programs make use of microcomputers, and a number of the programs that do

not offer classes in microcomputers expect the students to be computer proficient before they enter.

Technical Services

Only Information and Library Science programs offer courses in technical services, as this is an area distinctive to the field. Many business, and most computer science programs do offer classes in database systems and algorithms. The knowledge of database structure and design would be useful to a non-librarian attempting to understand the MARC record or library databases.

Networking

More Business Schools (30%) and Computer Science graduate departments (30%) offer courses dealing with Networking than do Schools of Information and Library Science (10%). Additionally, many Computer Science programs offer courses dealing with distributed systems, which while not specifically mentioning networking in the course descriptions, are likely to cover networking. Networking is a growing area. White found that 20% of classified advertisements for systems librarians specified networking experience as a requirement. This number is likely to rise. The move toward distributed systems is demonstrated in the Leonard study, which found local area network knowledge ranked higher than expected.

To meet the educational need, Schools of Information and Library Science will either need to develop courses in their schools, or encourage students to take courses outside the school to gain knowledge in networking.

Telecommunications

Only 20% of Schools of Information and Library Science and 20% of Business Schools offer classes in Telecommunications, and no courses are offered by Computer Science departments. Eleven percent of the listings in the White study required proficiency with telecommunications. Telecommunications knowledge is highly ranked in the Leonard study, a further indication of the move toward distributed systems.

The close relationship between telecommunications and networking is notable, and anyone possessing knowledge in wide area networks is probably familiar with basic telecommunications.

CD-ROM Technology

Although none of the programs offer courses in CD-ROM Technology, the topic is likely to be covered in courses on microcomputers. CD-ROM is only one application of personal computers, and an entire class would be unnecessary. It may be that the knowledge and skills required in this area will evolve from CD-ROM to the broader area of multimedia technology and systems.

User Support

None of the programs offered courses in User Support. It is not an area amenable to classroom instruction. Internships or field experiences provide an opportunity for developing user support skills. All of the Information and Library Science and Business programs offer credit for internships.

Mainframes, Minicomputers

Only a small percentage of the advertisements in the White study required experience with mainframes. Minicomputers were not mentioned. The Leonard study found that knowledge of mainframes and minis was one of the lowest ranked skills, but

still was received an average rank of importance of 3.3 out of 5. The respondents did, however, indicate a move away from mainframe and minicomputers to personal computers and local area networks.

The number of courses counted for the mainframes/minicomputers category was determined by counting courses that mentioned the use of a mainframe or minicomputer in the course description, regardless of the actual topic of the course. None of the Schools of Information and Library Science offer courses dealing with mainframe or minicomputers. Twenty percent of Business Schools have courses whose descriptions mention mainframe or minicomputers, as do 40% of Computer Science undergraduate courses. These courses are primarily programming classes, and it is likely that a much larger percentage of all categories use mainframe or minicomputers, but do not explicitly mention them in the course descriptions.

Programming

Twenty percent of Schools of Information and Library Science and 20% of Business Schools offer courses in Programming. Fifty percent of Computer Science graduate departments and 90% of undergraduate departments offer courses in specific languages, while all Computer Science programs offer courses in language development. Programming is the requirement least often mentioned in both the White and Leonard studies.

CONCLUSIONS

Overall, the Schools of Information and Library Science offer classes in more of the skills than either Computer Science or Business Schools. Nevertheless, the numbers for Schools of Information and Library Science are still quite low. Even for the most desirable skill, Automation/Project Management, only 50% of the Schools of Information and Library Science offer one course, and only one offers more, Indiana University with one full course and one course in which automation is one of several topics.

Of the nine categories listed, the University of North Carolina offers the widest variety of relevant courses, with full courses in six of the categories. Despite the growing importance of microcomputers and local area networks, 4 of the 10 Schools of Information and Library Science offer no Microcomputer courses, and 9 of 10 offer no Networking courses.

The question arises as to where an aspiring or practicing systems librarian can obtain these skills and knowledge. For example, only 30% of Business Schools, 30% of Computer Science undergraduate programs and 50% of Computer Science graduate programs offer Networking courses. Some Information and Library Science students will be able to take courses in the Business or Computer Science departments of their schools, but not all.

Further study is needed to determine where students can acquire this knowledge. An informal look at the announcements of several technical schools, community colleges and county adult education programs suggest that these schools may teach technical skills such as networking. Information and Library Science students are unlikely to be able to get credit from their programs for courses taken in these schools, but may need to take them in addition to their graduate course of study.

Internship or field experience programs are offered for credit in all of the Schools of Information and Library Science. These programs are an opportunity for

students to become acquainted with various aspects of systems librarianship, including gaining familiarity with the integrated library systems in use at their university. Students can use the internship opportunity to expand their knowledge in those areas which are lacking in formal courses.

Graduate Schools of Information and Library Science are not providing the entire education aspiring systems librarians students need. These schools need to determine whether it is satisfactory to provide only part of the education their students need, leaving the rest up to the student to obtain elsewhere, or whether they want to begin to offer courses normally found outside traditional graduate programs.

Courses offered by Computer Science Undergraduate Programs (Figure 5)

Number of courses offered by school and subject. P indicates courses that touch on the subject but are not wholly devoted to it.

	Stanford	Berkeley	MIT	Cornell	Illinois	Washington	Texas	Wisconsin	CIT	Princeton
Automation	0	0	0	0	0	0	0	0	0	0
Microcomputers	1	1	P	0	2	1	0	1	1	0
Technical Services	0	0	0	0	0	0	0	0	0	0
Networking	0	0	0	0	0	1	1	1	0	P
Telecommunications	0	0	0	0	0	0	0	0	0	0
CD-ROM Technology	0	0	0	0	0	0	0	0	0	0
User Support	0	0	0	0	0	0	0	0	0	0
Mainframes, Minis[6]	2	1	0	1	0	0	0	0	1	P
Programming[7]	4	5	P	3	1	4	3	3	2	2

[6]The course description explicitly mentions use of a mini- or mainframe computer.

[7]Classes in commercial languages, not language theory or development.

Courses offered by Computer Science Graduate Programs (Figure 4)

Number of courses offered by school and subject. P indicates courses that touch on the subject but are not wholly devoted to it.

	Stanford	Berkeley	MIT	Cornell	Illinois	Washington	Texas	Wisconsin	CIT	Princeton
Automation	0	0	0	0	0	0	0	0	0	0
Microcomputers	0	0	0	0	0	0	0	0	0	1
Technical Services	0	0	0	0	0	0	0	0	0	0
Networking	2	2	0	0	0	1	2	2	0	0
Telecommunications	0	0	0	0	0	0	0	0	0	0
CD-ROM Technology	0	0	0	0	0	0	0	0	0	0
User Support	0	0	0	0	0	0	0	0	0	0
Mainframes, Minis[4]	0	0	0	0	0	0	0	0	0	0
Programming[5]	0	0	0	0	0	2	1	2	1	1

[4]The course description explicitly mentions use of a mini- or mainframe computer.
[5]Classes in commercial languages, not language theory or development.

Courses offered by Business Schools (Figure 3)

Number of courses offered by school and subject. P indicates courses that touch on the subject but are not wholly devoted to it.

	Chicago	Michigan	Stanford	Indiana	Columbia	Illinois	Texas	MIT	NYU	UCLA
Automation	0	2	0	0	0	1	1	1	0	0
Microcomputers	1	2, P, P	0	1	1	0	2	P, P	1, P	P
Technical Services	0	0	0	0	0	0	0	0	0	0
Networking/LAN	0	P	0	0	P	0	1	P, P	1	1
Telecommunications	0	1	1	P	0	0	0	0	P	P
CD-ROM Technology	0	0	0	0	0	0	0	0	0	0
User Support	0	0	0	0	0	0	0	0	0	0
Mainframes, Minis	1	0	0	P	0	0	P	1, P	P	0
Programming	P	0	0	P	P	P	0	P	1, P	2

Courses offered by Schools of Information and Library Science (Figure 2)

Number of courses offered by school and subject. P indicates courses that touch on the subject but are not wholly devoted to it.

	Illinois	UNC-CH	Michigan	Wisconsin	Indiana	UCLA	Rutgers	Pittsburgh[3]	Syracuse	Berkeley
Automation	P, P	1	1	0	1, P	1	P	1	P	P, P
Microcomputers	0	1	1	1	2	0	P	1	1	P
Technical Services	4	3	4	2	2	5	2, P	2	1	3
Networking	0	2	0	0	P	0	0	0	P	0
Telecommunications	0	1	0	P	0	0	0	0	P	P
CD-ROM Technology	0	0	0	0	0	0	0	0	0	0
User Support	0	0	0	0	0	0	0	0	0	0
Mainframes, Minis	0	0	0	0	0	0	0	0	0	0
Programming	0	1	0	P	0	0	0	0	4	P

[3]Only includes courses from the Master of Library Science Program. The Master of Science in Information Science and Master of Science in Telecommunications programs offered by the Department of Information Science are not comparable with the Information Science programs in the other schools.

Percentage of Schools Offering Courses (Figure 1)

Percentage of Programs offering courses. Partial indicates courses the program offers that touch on the topic, but are not wholly devoted to it.

	SILS	SILS Partial	Business Schools	Business Schools Partial	Computer Science Graduate	Computer Science Graduate Partial	Computer Science Undergrad	Computer Science Undergrad Partial
Automation	50	50	40	0	0	0	0	0
Microcomputers	60	20	60	20	10	0	60	10
Technical Services	100	0	0	0	0	0	0	0
Networking	10	20	30	30	50	0	30	10
Telecommunications	20	20	20	30	0	0	0	0
CD-ROM Technology	0	0	0	0	0	0	0	0
User Support	0	0	0	0	0	0	0	0
Mainframes, Minis[1]	0	0	20	40	0	0	40	10
Programming[2]	20	20	20	60	50	0	90	10

[1]Course description explicitly mentions the use of mini- or mainframe computer. Many classes in Computer Science use mini- or mainframe computers.

[2]Classes in commercial languages, not in language theory or development.

BIBLIOGRAPHY

Boyce, B. R. & Heim, K. M. (1988). The education of library systems analysts for the nineties. Journal of Library Administration, 9(4): 69-76.

Bryne, J. A. (1993). Business Week guide: the best business schools. 3rd edition. New York : McGraw Hill.

Campbell, J. D. (1993). Choosing to have a future. American Libraries, June: 560-566.

Chu, F. T. (1990). Evaluating the skills of the systems librarian. Journal of Library Administration, 12(1): 91-102.

Curtis, A. (1987). Education and automation - present and future concerns. (pp. 108-109). Library Hi Tech, 18: 105-112.

Leonard, B. G. (1993). The role of the systems librarian/administrator: a preliminary report. Library Administration and Management, 7(2): 113-116.

Malinconico S. M. (1989). Librarians in an age of technology. Library Administration and Management, Summer: 142-144.

Martin, S. K. (1988). The role of the systems librarian. Journal of Library Administration, 9(4): 57-68.

McLain, J. P. et al. (1990). Educating for automation: can the library schools do the job? Journal of Library Administration, 13(1-2): 7-20.

Ridgeway, M. and Gattone, D. (1987). Education and automation - present and future concerns (pp. 107-108). Library Hi Tech, 18: 105-112.

Rowe, R. R. (1989). Developing managerial competence for library automation (pp. 104-106). Library Hi Tech, 7(2): 103-112.

Rush, J. (1987). Library automation and library education (pp. 97-99). Library Hi Tech, 18: 95-104.

Stanford University
University of California at Berkeley
Massachusetts Institute of Technology
Cornell University
University of Illinois at Urbana-Champaign
University of Washington
University of Texas at Austin
University of Wisconsin at Madison
California Institute of Technology
Princeton University

APPENDIX A

The Schools of Information and Library Science used in this study are the top ten programs at the master's level listed in White, H. (1993). The Business Schools are the top ten listed in Byrne (1993) that have programs in Information Systems Management. Not all of the schools have such programs, so the schools included are not the absolute top ten listed, but the ten in the top 16 that have Information Systems concentrations. The Computer Science programs are the top ten listed in U.S. News & World Report (1993). Carnegie-Mellon is excluded because it's Computer Science department is a research intensive program leading to a doctoral degree. Carnegie-Mellon does not offer a Master's in Computer Science. Students are not required to participate in structured courses.

Schools of Information and Library Science

University of Illinois at Urbana-Champaign
University of North Carolina at Chapel Hill
University of Michigan
University of Wisconsin at Madison
Indiana University
University of California at Los Angeles
Rutgers University
University of Pittsburgh
Syracuse University
University of California at Berkeley

Business Schools

University of Chicago
University of Michigan
Stanford University
Indiana University
Columbia University
University of Illinois
University of Texas at Austin
Massachusetts Institute of Technology
New York University
University of California at Los Angeles

Computer Science Programs

U.S. News & World Report (1993). Best graduate schools: the sciences. U.S. News & World Report, March 22: 76.

White, H. S. (1993). Rankings of library and information science faculty and programs: the third in a series of studies undertaken at six-year intervals. Library Quarterly, 63(2): 166-188.

White, S. M. (1993). Systems/computer intensive positions in academic and public libraries: a content anaysis of position advertisements. Unpublished master's paper, University of North Carolina at Chapel Hill.