The Interdisciplinary Influence of Library and Information Science 1996–2004: A Journal-to-Journal Citation Analysis

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Using citation data from *Journal Citation Reports* (*JCR*) 1996–2004, this research replicates Meyer and Spencer's analysis of other-field citations to Library and Information Science (LIS) journals from 1972 to 1994. After 1994, *JCR* added LIS journals emphasizing empirical, information science research and simultaneously dropped journals addressing the profession of librarianship. The newly added journals attract a broader interdisciplinary readership—a readership reflected in a 14 percent increase in other-field citations of the LIS journals. The LIS journals included in both this and the Meyer and Spencer research, a list dominated by titles frequently read and cited by others in the LIS discipline, have not received an equal increase in other-field citations.

ibrary and Information Science (LIS) scholars, not unlike scholars in any academic discipline, generally write to their peers and are subsequently published and cited in journals addressing the research interests of their field. In recent years, articles published in Library and Information Science journals have annually received over 10,000 citations; not surprisingly, most of these citations originate in other LIS journals.[1] A portion of these articles are also cited in journals associated with other academic disciplines and professional fields; however, when compared with the journal literatures of other fields, LIS research attracts a narrow interdisciplinary citing audience. In 1984, as Clement Y.K. So demonstrated, LIS journals were the least likely of all the Social Science disciplines to be cited by other fields.[2] Although the leading Social Science fields (Psychiatry, Psychology, Economics, Business, and Sociology) received over 25 percent, and the less "developed" fields (Anthropology, Education, Political Science, Languages, and Communication) received at least 15 percent, LIS journals received only 8 percent of their total citations from other disciplines.[3] Thus, if citations are an indication of an engaged reading audience, the broader academic community in 1984 had little interest in LIS research.

A decade later, however, external interest in the library field increased. Terry

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Meyer and John Spencer, in reviewing twenty-four leading LIS journals from 1972 to 1994, found that citations from other disciplines had risen from 8 percent to 13 percent—1,931 of 14,378 total citations received.[4] The fields most likely to cite LIS articles included Computer Science (contributing 15.5% of all non-LIS citations), Social Sciences (11.6%), Medicine (10.2%), and Psychology (9.9%).[5] The authors also found that journals with an emphasis on quantitative and experimental research in the information sciences were the most likely to receive non-LIS citations. In fact, three of these journals (*Scientometrics*, *Journal of the American Society for Information Science*,[6] and *Journal of Documentation*) together received over one-half (1,059/1,931) of all the other-field citations to LIS journals.[7] Furthermore, the first two of these titles claimed a disproportionate number of citations, 25.7% (496/1,931) and 21.2% (409/1,931) respectively, while ten of the twenty-four journals in the study received less than 1 percent of the non-LIS citations.[8] If *Scientometrics* and *Journal of the American Society for Information Science* were excluded from Meyer and Spencer's citation counts, other-field citations to LIS journals would drop from 13 to 9 percent of all citations received.[9]

Meyer and Spencer's citation study spanned a 22-year period in which information technologies transformed libraries and library science research.[10] Today these technologies, and more recent innovations, have changed research practices in most academic fields; they have also become inseparable from the study of LIS and the provision of many library services. The growing importance of information science and technology to the discipline is likewise evident in the ever-evolving title list of the *Journal Citation Reports*' (*JCR*) "Information Science and Library Science" subject category. Since 1994, one-half of the titles that once ranked (by "Impact Factor") in the top twenty-four titles in the subject category fell into the lower-ranked titles, ceased publication, changed editorial focus, or were dropped from *JCR*'s index.[11] Many of the leading LIS journals slipped below, or were replaced by, titles newly introduced to the subject category. As journals addressing the practice and profession of library science were dropped from the *JCR* subject category, a portion of the category's readers were likely also lost—an unknown number of librarians and library science researchers and educators. On the other hand, these readers may have become more interested in an increasingly relevant information science and technology literature. Whatever precipitated this change in the subject category, many of the new titles (particularly those with some of the highest impact factors) emphasized quantitative and experimental information science research, including: *MIS Quarterly*, *International Journal of Geographical Information Science*, *Information Research*, *Journal of the American Medical Informatics Association*, and *Information & Management*.

The literature of any discipline can be expected to change when innovations open a field to new research methods and subjects; how or if these technologies will change the field's position within the academic community is less certain. If these innovations, directly or indirectly, are promoting an increase in quantitative research, and if (as Meyer and Spencer observed) these articles attract a wider reading and citing audience than do qualitative and interpretive articles, the norms and standards by which the discipline evaluates scholarship may change.[12] These evolving research standards and methods may also increase the rate at which LIS articles are cited by other fields. If these factors, or others that contributed to a 6 percent increase in other-field citations from 1984 to 1994, have continued to influence LIS scholarship in recent years, the discipline's reputation for insularity and isolation may no longer be merited.

Research Question

Using data from *Journal Citation Reports* 1996–2004, the authors measure the de-

veloping influence of LIS journal literature by replicating Meyer and Spencer's "A Citation Analysis Study of Library Science: Who Cites Librarians?"[13] By updating Meyer and Spencer, this citation study quantifies the ratio of other-field citations to self-citations for the cited LIS subject category. The analysis also ranks journals within the discipline by other-field citations received and identifies the subject categories and journals that most frequently cite LIS articles. In tracking the intellectual export of the field's scholarship, this research seeks to answer the question: what is the interdisciplinary impact of LIS scholarship?

Literature Review

Following the publication of Eugene Garfield's *Citation Indexes for Science* and the subsequent introduction of the indexes for Sciences and Social Sciences, citation analysis, as shown by Anton J. Nederhof and also Thomas E. Nisonger, became a common quantitative measure of academic influence and productivity.[14] Scholars have also used citation analysis to study the implied relationships among those who share, give, or receive citations. The study of these citation patterns aims to reveal how (as Garfield noted in "Citation Indexing for Studying Science") "each brick of the edifice of science is linked to all the others."[15] Often with this goal in mind (as in research by Kevin W. Boyack, Richard Klavans, and Katy Börner; Bluma C. Peritz and Judit Bar-Ilan; Howard D. White and Katherine W. McCain; and others) scholars have employed author co-citation, bibliographic coupling, journal-to-journal, and other methods of analysis to establish shared intellectual lineages, to map scholarly communication, and to delineate various knowledge domains and academic disciplines.[16]

Much of this research, as Stephen P. Harter, Thomas E. Nisonger, and Aiwei Weng remind us, extends from Robert K. Merton's premise that a citation serves "a social, normative function."[17] Oth-

ers, as Henry G. Small notes, were often directly inspired by Thomas S. Kuhn's suggestion that the study of "references" could identify communities of scholars sharing a "disciplinary matrix" or "paradigm."[18] Toward this end, Chaomei Chen et al. and Eugene Garfield, A.I. Pudovkin, and V.S. Istomin (and others) have used citation analysis to document the developing trends and shifting paradigms of science.[19]

Reviews of these efforts, even by advocates, generally agree with White and McCain that the more commonly used citation analysis methods may be too blunt to detect the subtle signs of a coming scientific revolution.[20] These reviews, however, have reaffirmed the use of citation analysis methods to measure a paradigm shift in its later stages or, as Small asserts, after the research has, in Kuhn's terms, adjusted to the new "normal science."[21]

Citation studies examining the shifting profile of LIS research have not only charted and mapped citation patterns within the discipline, as did Denise Koufogiannakis and Linda Slater, but have also provided, in Lokman I. Meho and Kristina M. Spurgin, and also in Christian Schloegl and Wolfgang G. Stock, comparative assessments of the productivity, influence, and rigor of the field's journal literature.[22] The results that these and other assessments provide have not been encouraging. Robert Grover, Jack Glazier, and Maurice Tsai characterized the field's research as underdeveloped; Jeffery N. Gatten demonstrated the field's isolation and high rate of self-citation; and Lynne McKechnie and Karen E. Pettigrew found an absence of a rigorous theoretical and conceptual foundation.[23] Reports such as these have prompted essays by John M. Budd, by Bill Crowley, and by Peter Hernon calling for intentional efforts to redefine the norms of quality research and to purposefully change the LIS paradigm.[24]

Although these manifestos for reform may themselves indicate a shift in the

research paradigm already well underway, revolutionary changes in the LIS field are more commonly attributed, as by Julian Warner and others, to the pace of technological innovation.[25] While transforming the field of LIS, information technologies have also changed research and research methods across multiple academic disciplines. LIS, therefore, may now share more areas of common interest with other fields than in earlier decades. This observation is evident in the multiple *JCR* subject categories that currently include "Information Science and Library Science" journals.[26] If these and newer shared interdisciplinary interests have continued to grow, and if the most influential articles are, as Meyer and Spencer observed, more often published in journals emphasizing quantitative and experimental research, the norms of quality LIS research may shift accordingly.[27] If so, accompanying changes in the LIS citation profile (the map of what disciplines are reading and citing the field's journal literature) will be observed. Thus, although a variety of citation analysis methods could be used to examine recent changes in LIS scholarship, a study of citations from other fields best reveals the broader relevance of the research.

Methodology

The data for this citation study were acquired from *Journal Citation Reports* (1996–2004). Using *JCR*'s "Subject Category" tables, a list of "Information Science and Library Science" journals for each year of this study was established. The resulting "Information Science and Library Science" title list included sixty-seven journals. For each of these titles, *JCR*'s "Cited Journal" tables were used to build lists of citing journals. These lists were imported into a single spreadsheet with columns for the JCR year, the cited journal, the citing journal, and the number of citations granted. Thus, for example, *Journal of Documentation* in the year 2000 received a total of 417

citations from sixty-six citing journals. These citing journals included titles from the LIS discipline (such as *Library Quarterly*—six citations) and from journals in other subject categories (such as *Computational Intelligence* in the "Computer Science, Artificial Intelligence" subject category—four citations).

To identify the subject categories citing LIS journals, the citing titles were compared with the subject category lists in *JCR*'s Science and Social Science editions. After identifying each citing journal's subject category (or categories), these subjects were added as a column to the spreadsheet described above. Some citing journals were not included in *JCR*'s subject category lists and were excluded from the subject category citation totals. An additional number of citations to some of the LIS journals were identified as "ALL OTHERS" by *JCR*; these citations were also excluded from the subject category totals.[28]

From 1996 to 2004, *JCR* provided title lists for 256 subjects (Science, 194; Social Science, 62); 215 of these subjects cited LIS journals. To avoid inflated subject category totals, citations from journals listed in more than one subject category were adjusted by dividing the number of citations received by the number of subjects represented. Thus, in the year 2000, the LIS journal *Scientometrics* received three citations from Issues & Studies, a journal included in two subject category lists—"International Relations" and "Political Science." Therefore, these citations were recorded as 1.5 citations from the first category and 1.5 citations from the second category. To clarify the results, all 256 subjects were consolidated in thirty-eight "Research Areas"; for example, all subjects including the word "computer" were grouped under the heading "Computer Science & Technology."

After identifying citing journals and their subject categories, all citations from LIS journals (self-citations) were subtracted from the total citations to LIS titles. The remaining citations, all from

other fields, were sorted and subtotaled by subject category, cited journal, citing journal and citing year.[29] These citation totals are reported in table 1 with each journal's other-field citations to self-citations ratio and with each journal's portion of all the other-field citations received by LIS journals.

Finally, using the same citation data (*JCR* 1996–2004), a second set of citation totals and subtotals were established for only the twenty-two LIS titles both included in Meyer and Spencer's study and indexed by *JCR* after 1995. Two of the twenty-four titles from this earlier research were not indexed by *JCR* during the nine years represented in this study. The remaining twenty-two titles were indexed by *JCR* for all or some of the years (see table 1). By excluding the newer (and often highly cited) LIS journals, this replicated title list isolates the interdisciplinary interest in the field's traditional, mainstream journal literature. The citation counts for the replicated title list are reported side-by-side with the Meyer and Spenser findings in table 5.

Results

The sixty-seven journals listed in *JCR* subject category Information Science & Library Science received 109,775 citations from 1996 to 2004. Of these total citations, 29,622 (27.0%) were from journals listed in other *JCR* subject categories; 58,318 were from the LIS subject category, 12,326 were listed as "ALL OTHERS," and 9,509 were generated by titles not included in *JCR*'s subject lists (see figure 1). During these years, with a cumulative other-field to self-citations ratio of 0.5 (29,622/58,318), the other-field citations ratio increased from 0.2 (1,180/5,066) in 1996 to 0.7 (6,249/8,412) in 2004. The percentage of the total citations to LIS journals granted by non-LIS journals also increased—beginning at 17.7 percent (1,180/6,657) in 1996 and rising to 34.7 percent (6,249/18,025) in 2004.

Of the LIS titles tracked by *JCR* from 1996 to 2004, thirteen were more often cited by journals in other categories than by LIS journals; the five journals with the greatest ratio of other-field citations to subject category self-citations were: *Knowledge Acquisition*, 19.6 (157/8);[30] *Social*

FIGURE 1
Citations to LIS Journals 1996–2004

Cites Listed as "ALL OTHERS" by JCR, 12,326, 11%

Cites from Journals Without Identified Subject Categories, 9,509, 9%

Other-Field Cites to LIS, 29,622, 27%

LIS Self Cites, 58,318, 53%

- ☐ Other-Field Cites to LIS
- ■ LIS Self Cites
- ☐ Cites from Journals Without Identified Subject Categories
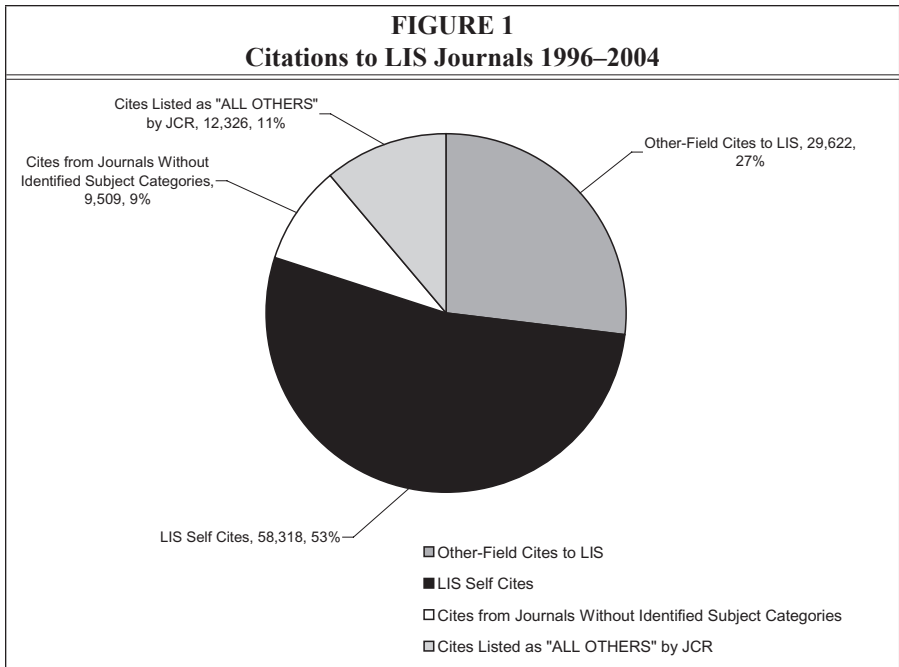- ☐ Cites Listed as "ALL OTHERS" by JCR

TABLE 1
Cited LIS Journals, 1996-2004

Journal Title	Years Indexed JCR	OF* Cites	Self Cites	All Others	Unassigned Categories	Total Cites	OF/ Self Cites	% of All OF Cites to LIS Journals
MIS Quarterly	1997-2004	6,389	4,160	519	880	11,948	1.5	21.6
Journal of the American Medical Informatics Association	1997-2004	3,862	2,092	879	734	7,567	1.9	13.0
International Journal of Geographical Information Science	1997-2004	2,720	804	622	381	4,527	3.4	9.2
Information & Management	1997-2004	2,383	2,014	554	416	5,367	1.2	8.0
Journal of the American Society for Information Science and Technology	1997-2004	2,143	8,510	821	1,602	13,076	0.3	7.2
Information Processing & Management	1997-2004	1,498	2,931	584	781	5,794	0.5	5.1
Information Systems Research	1997-2004	1,098	996	347	215	2,656	1.1	3.7
Scientometrics	1997-2004	1,077	4,441	377	444	6,339	0.2	3.6
Social Science Information	1997-2004	630	176	944	79	1,829	3.6	2.1
Telecommunication Policy	1997-2004	610	842	352	118	1,922	0.7	2.1
Journal of Management Information Systems	1997-2004	603	477	117	79	1,276	1.3	2.0
International Journal of Information Management	1997-2004	596	485	358	81	1520	1.2	2.0
Scientist	1997-2004	565	1,987	763	55	3,370	0.3	1.9
Journal of the Medical Library Association	1997-2004	563	1,336	393	135	3,027	0.3	1.9
Journal of Information Technology	1997-2004	491	314	257	78	1,140	1.6	1.7
Journal of Documentation	1997-2004	456	3,554	370	396	4,776	0.1	1.5
Journal of Health Communication	1997-2004	363	108	208	17	696	3.4	1.2

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Journal Title	Years Indexed JCR	OF* Cites	Self Cites	All Others	Unassigned Categories	Total Cites	OF/ Self Cites	% of All OF Cites to LIS Journals
Social Science Computer Review	1997-2004	318	185	292	35	830	1.7	1.1
Information Society	1997-2004	271	353	316	100	1,040	0.8	0.9
Information Systems Journal	1997-2004	249	385	113	78	825	0.6	0.8
Restaurator-International Journal for the Preservation of Library and Archival Material	1997-2004	221	460	12	49	742	0.5	0.7
Journal of Information Science	1997-2004	170	1,522	426	166	2,284	0.1	0.6
Law Library Journal	1997-2004	162	598	18	21	799	0.3	0.5
Knowledge Acquisition	1996	157	8	36	72	273	19.6	0.5
Program-Electronic Library and Information Systems	1996-2004	145	332	129	111	717	0.4	0.5
Annual Review of Information Science and Technology	1996-99, 2001-04	125	1,208	183	109	1,625	0.1	0.4
Online	1996-2004	111	738	239	90	1,178	0.2	0.4
Econtent	1996-2004	110	575	113	68	866	0.2	0.4
Information Technology and Libraries	1996-2004	95	402	68	41	606	0.2	0.3
Electronic Library	1996-2004	84	326	61	42	513	0.3	0.3
Government Information Quarterly	1996-2004	75	364	23	27	489	0.2	0.3
Journal of Information Ethics	1997-2004	75	159	41	20	295	0.5	0.3
Behavioral & Social Sciences Librarian	1996-2000	72	206	54	11	343	0.3	0.2
Library Journal	1996-2004	71	1,675	313	292	2,351	0	0.2
Canadian Journal of Information and Library Science	1996-2004	70	187	25	19	301	0.4	0.2

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Cited LIS Journals, 1996-2004

Journal Title	Years Indexed JCR	OF* Cites	Self Cites	All Others	Unassigned Categories	Total Cites	OF/ Self Cites	% of All OF Cites to LIS Journals
Knowledge Organization	1996-2004	69	199	6	27	301	0.3	0.2
Journal of Librarianship and Information Science	1996-2004	67	325	38	24	454	0.2	0.2
Journal of Academic Librarianship	1996-2004	66	1,304	182	190	1,742	0.1	0.2
Library & Information Science Research	1996-2004	65	946	130	70	1,211	0.1	0.2
Internet World	1997-98, 2000	63	32	113	10	218	2	0.2
Library Trends	1996-2004	63	1,389	172	215	1,839	0	0.2
Aslib Proceedings	1996-2004	62	565	106	46	779	0.1	0.2
Online Information Review	1996-2004	57	294	29	38	418	0.2	0.2
Research Evaluation	2002-04	54	91	4	10	159	0.6	0.2
Interlending & Document Supply	1996-2004	50	298	17	18	383	0.2	0.2
Journal of Scholarly Publishing	1996-2004	44	97	22	38	201	0.5	0.1
Journal of Government Information	1996-2004	43	236	14	29	322	0.2	0.1
College & Research Libraries	1996-2004	41	2,471	135	375	3,022	0	0.1
Libri	1996-2004	35	404	34	66	539	0.1	0.1
Library Quarterly	1996-2004	33	1,202	144	146	1,525	0	0.1
Journal of Education for library and Information Science	1996-97, 99	30	328	36	7	401	0.1	0.1
Library and Information Science	1996, 1999-2000	22	257	10	23	312	0.1	0.1
Library Resources & Technical Services	1996-2004	22	606	22	91	741	0	0.1

TABLE 1
Cited LIS Journals, 1996-2004

Journal Title	Years Indexed JCR	OF* Cites	Self Cites	All Others	Unassigned Categories	Total Cites	OF/ Self Cites	% of All OF Cites to LIS Journals
Library Collections Acquisitions & Technical Services	1996-2004	20	289	17	58	384	0.1	0.1
Proceedings of the ASIS Annual Meeting	1996-99, 2001-03	18	209	12	7	246	0.1	0.1
Reference & User Services Quarterly	1996-2004	18	638	43	85	784	0	0.1
Information Research- An International Electronic Journal	2004	14	76	7	7	104	0.2	0
International Forum on Information and Documentation	1996-99	10	59	10	5	84	0.2	0
NFD Information – Wissenschaft Und Praxis	1996-2003	8	38	12	12	70	0.2	0
Library High Tech	1996-98	7	123	23	3	156	0.1	0
Zeitschrift Fur Bibliothekswesen Und Bibliographie	1996-2004	6	88	5	16	115	0.1	0
Special Libraries	1996-98	3	118	18	20	159	0	0
portal- Libraries and the Academy	2004	2	54	0	10	66	0	0
Wilson Library Bulletin	1996-97	2	58	28	4	92	0	0
American Archivist	1996	0	4	7	17	28	0	0
CD-ROM Professional	1996	0	8	2	0	10	0	0
International Information & Library Review	1996	0	2	1	0	3	0	0
Totals:		29,622	58,318	12,326	9,509	109,775	0.5	100

* OF = Other Field

TABLE 2 Citing Journals Responsible for 50% (14,711/29,622) of All Other-Field Cites to LIS		
Citing Journal	**Total Cites**	**% of All OF* Cites to LIS Journals**
Lecture Notes in Computer Science	1,098	3.7
Journal of Computer Information Systems	880	3.0
Decision Support Systems	818	2.8
European Journal of Information Systems	793	2.7
International Journals of Medical Informatics	710	2.4
Journal of Strategic Information Systems	623	2.1
Decision Science	567	1.9
Methods of Information in medicine	523	1.8
Omega-International Journal of Management Science	439	1.5
International Journal of Human-Computer Studies	428	1.4
IEEE Transactions on Engineering Management	424	1.4
Internet Research-Electronic Networking Applications and Policy	399	1.3
Behaviour & Information Technology	338	1.1
Industrial Management & Data Systems	330	1.1
Journal of Biomedical Informatics	329	1.1
ACM Transactions on Information Systems	318	1.1
International Journal of Electronic Commerce	292	1.0
Research Policy	275	0.9
Group Decision and Negotiation	261	0.9
Communications of the ACM	250	0.8
Journal of Systems and Software	248	0.8
Wirtschaftsinformatik	241	0.8
Computers in Human Behavior	231	0.8
Expert Systems with Applications	223	0.8
Photogrammetric Engineering and Remote Sensing	223	0.8
Journal of Organizational Computing and Electronic Commerce	220	0.7
Information and Software Technology	203	0.7
European Journal of Information Systems	195	0.7
Interacting with Computers	172	0.6
Environment and Planning B-Planning & Design	169	0.6
JAMA-Journal of the American Medical Association	159	0.5
International Journal of Technology Management	156	0.5
Lecture Notes in Artificial Intelligence	156	0.5

TABLE 2
Citing Journals Responsible for 50% (14,711/29,622) of
All Other-Field Cites to LIS

Citing Journal	Total Cites	% of All OF* Cites to LIS Journals
Artificial Intelligence in Medicine	147	0.5
Management Science Series A-Theory	143	0.5
Organization Science	141	0.5
British Medical Journal	140	0.5
Journal of Chemical Information and Computer Sciences	125	0.4
IEEE Transactions on Knowledge and Data Engineering	123	0.4
International Journal of Operations & Production Management	117	0.4
Information Retrieval	115	0.4
Information Systems Management	115	0.4
International Journal of Remote Sensing	106	0.4
Journal of the Operational Research Society	102	0.3
Annals of Internal Medicine	99	0.3
Technovation	95	0.3
Proceedings of the National Academy of Sciences of the United States	93	0.3
Computers & Education	91	0.3
Geographical Analysis	90	0.3
M D Computing	90	0.3
Annals of the Association of American Geographers	88	0.3
*OF = Other-Field		

Science Information, 3.6 (630/176); *International Journal of Geographical Information Science,* 3.4 (2,720/804); *Journal of Health Communication,* 3.4 (363/108); and *Internet World,* 2.0 (63/32).[31] More than one-half (51.8%) of all the other-field citations to LIS titles were granted to only four journals: *MIS Quarterly*, 21.6% (6,389/29,622); *Journal of the American Medical Informatics Association*, 13.0% (3,862/29,622); *International Journal of Geographical Information Science*, 9.2% (2,720/29,622); and *Information & Management*, 8.0% (2,383/29,622). An additional seven journals (*Journal of the American Society for Information Science and Technology*, 7.2%; *Information Processing & Management*, 5.1%; *Information Systems Research*, 3.7%; *Scientometrics*, 3.6%; *Social Science Information*, 2.1%; *Telecommunications Policy*, 2.1%; and *Journal of Management Information Systems*, 2.0%) earned the next quarter of the discipline's other-field citations. As shown in table 1, the remaining fifty-six journals, with forty-nine of these titles each acquiring less than one percent of the total, split the final quarter of the discipline's other-field citations.[32]

The disciplines citing LIS journals in these years are represented by 1,903 journals from other fields. Nearly one-half (49.7%, 14,711/29,622) of the other-field citations were generated by only fifty-one of these titles. The first twelve titles contributed over one-quarter (26.0%,

7,702/29,622) of the citations (refer to table 2); eight journals cited the LIS category more than 500 times: *Lecture Notes in Computer Science*, 3.7% (1,098); *Journal of Computer Information Systems*, 3.0% (880); *Decision Support Systems*, 2.8% (818); *European Journal of Information Systems*, 2.7% (793); *International Journal of Medical Informatics*, 2.4% (710); *Journal of Strategic Information Systems*, 2.1% (623); *Decision Sciences*, 1.9% (567); and *Methods of Information in Medicine*, 1.8% (523).

Citations to LIS journals were likewise distributed across 215 of the distinct *JCR* subject categories. From 1996 to 2004, nine of these subjects provided over one-half (50.8%, 15,035.9/29,622.0) of the citations to LIS journals (refer to table 3): "Computer Science, Information Systems," 16.1% (4,765.3/29,622.0); "Management," 8.0% (2,368.3/29,622.0); "Computer Science, Theory & Methods," 5.6% (1,644.1/29,622.0); "Computer Science, Artificial Intelligence,"

TABLE 3			
JCR Subject Categories Citing LIS Journals 1996-2004			
Subject Categories Responsible for 1% or More of All OF* Cites to LIS	Cites to LIS	Mean Number of Journals Published Per Year	% of All OF* Cites to LIS
Computer Science, Information Systems	4,765.3	66.1	16.1
Management	2,368.3	67.0	8.0
Computer Science, Theory & Methods	1,644.1	64.4	5.6
Computer Science, Artificial Intelligence	1,278.3	66.1	4.3
Operations Research & Management Science	1,149.3	48.8	3.9
Computer Science, Interdisciplinary Applications	1,132.7	72.8	3.8
Medicine, General & Internal	1,001.9	104.9	3.4
Business	859.6	55.0	2.9
Medical Informatics	836.4	18.4	2.8
Computer Science, Software Engineering	765.3	70.3	2.6
Health Care Sciences & Services	563.3	39.9	1.9
Communications	526.0	40.0	1.8
Engineering, Industrial	521.9	29.4	1.8
Computer Science, Cybernetics	510.2	17.4	1.5
Geography	447.9	32.4	1.5
Education and Educational Research	435.3	96.7	1.5
Multidisciplinary Sciences	403.7	50.9	1.4
Ergonomics	392.2	23.2	1.3
Psychology, Multidisciplinary	353.8	102.7	1.2
Social Sciences, interdisciplinary	318.4	57.8	1.1
Engineering, Electrical & Electronic	316.5	200.3	1.1
Environmental Studies	301.1	45.1	1.0
*OF = Other-Field			

TABLE 4			
Research Areas Citing LIS Journals 1996 – 2004			
Research Areas	**Cites to LIS**	**Mean Number of Journals Published Per Year**	**Percentage of all Other-Field Cites to LIS**
Computer Science and Technology	10,337.1	404.4	34.9%
Business and Management	4,434.8	204.4	15.0%
Medicine	2,783.3	1,702.6	9.4%
Engineering	1,362.8	677.2	4.6%
Psychology, Neurology, and Behavioral Sciences	1,229.1	911.9	4.1%
Medical Technologies	997.1	124.8	3.4%
Ecological and Environmental Studies	741.6	275.0	2.5%
Public and Social Services	626.4	284.7	2.1%
Geography	620.7	53.7	2.1%
Automation, Imaging and Acoustics	613.6	216.8	2.1%
Communications	526.0	40.0	1.8%
Education	524.0	119.2	1.8%
Social Science Studies, Interdisciplinary	439.2	142.8	1.5%
Political Science and International Studies	410.0	190.3	1.4%
Multidisciplinary Sciences	403.7	50.9	1.4%
Ergonomics	392.2	15.0	1.3%
Biosciences	381.6	1,075.3	1.3%
Geosciences	336.5	283.8	1.1%
Economics	255.1	162.9	0.9%
Chemistry	250.9	413.0	0.8%
Law	242.9	106.6	0.8%
Sociology	242.5	92.4	0.8%
Agriculture and Food Sciences	240.3	351.0	0.8%
Nursing	178.5	52.6	0.6%
Natural Resources	155.4	92.0	0.5%
Social Issues	149.4	87.3	0.5%
Math	115.6	281.7	0.4%
History	115.0	70.4	0.4%
Social Science Methods	90.8	89.9	0.3%
Zoological Sciences	81.8	251.8	0.3%
Anthropology	78.0	49.6	0.3%
Materials Science	75.4	281.9	0.3%

TABLE 4 (continued)
Research Areas Citing LIS Journals 1996 – 2004

Research Areas	Cites to LIS	Mean Number of Journals Published Per Year	Percentage of all Other-Field Cites to LIS
Applied Linguistics	69.3	39.9	0.2%
Physics, Nuclear Science and Technology	62.5	326.8	0.2%
Mining, Metallurgy and Fuels	18.3	108.5	0.1%
Sport Sciences	16.8	60.3	0.1%
Demography	16.5	16.8	0.1%
Philosophy	7.5	20.3	0.0%
Totals:	29,622.0		

4.3% (1,278.3/29,622.0); "Operations Research & Management Science," 3.9% (1,149.3/29,622.0); "Computer Science, Interdisciplinary Application," 3.8% (1,132.7/29,622.0); "Medicine, General & Internal," 3.4% (1,001.9/29,622.0); "Business," 2.9% (859.6/29,622.0); and "Medical Informatics," 2.8% (836.4/29,622.0).

Similar results were observed after consolidating *JCR*'s 256 subject categories into thirty-eight Social Science and Science "Research Areas"; journals in the "Information Science and Library Science" subject category drew citations from computer, management, and medical fields. Citations from these Research Areas were also unevenly distributed. Less than one-half (seventeen) of the thirty-eight subject areas contributed over 90 percent (90.6%, 26,823.2/29,622.0) of the other-field citations (refer to table 4). Nearly one-half of the citations were

FIGURE 2
Research Areas Citing LIS More than Once per Mean Number of Annually Published Journals, 1996–2004
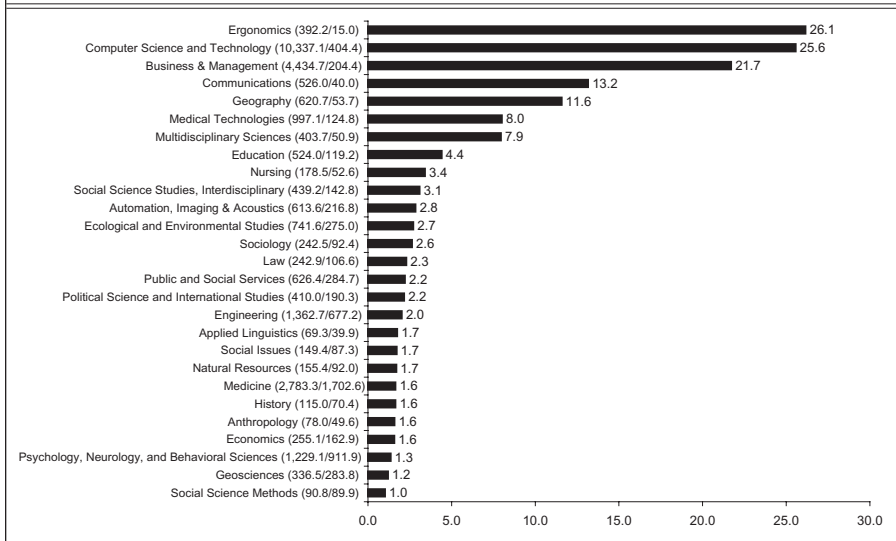
granted by only two research areas: Computer Science & Technology, 34.9% (10,337.1/29,622.0) and Business & Management, 15.0% (4,434.8/29,622.0).

Additional fields can be identified as heavy importers of LIS research after adjusting the field's citations to the mean, annual number of journals published in each research area. As shown in figure 2, seventeen fields cited the LIS subject category two or more times per journal title. The five research areas with the most citations to LIS per published journal include: Ergonomics, 26.1; Computer Science & Technology, 25.6; Business & Management, 21.7; Communications, 13.2; and Geography, 11.6. Comparatively, some large fields with high totals for citations to LIS journals were not heavy importers of LIS research—notably, Medicine (1,702.6 journals) and Psychology (911.9 journals), which contributed 9.4% and 4.1% of all other-field citations to LIS, but cited the subject category only 1.6 and 1.4 times per published Medicine and Psychology journal.

Discussion

When compared with Meyer and Spencer, these results show that the fields most likely to cite LIS literature from 1972 to 1994 have continued to cite LIS journals more than most disciplines do. Two subjects, however, have doubled their shared portion of citations to LIS literature: Computer Sciences (from 15.5% to 34.9%) and Business & Management (from 8.0% to 15.0%).[33] Medicine (9.4%) has continued to provide close to one-tenth of all other-field citations, and Psychology (4.1%) and Engineering (4.6%) also continue to provide LIS journals more citations than most Science and Social Science fields. Ergonomics, when adjusted for the field's size (with an average of only fifteen journals published annually) was also a leading citer in both studies, with 4.6% (1972–1994) and 1.3% (1996–2004) of the other-field citations to LIS. Likewise, although the number of LIS titles sharing just over 50 percent of the other-field

citations has increased from three (*Scientometrics,* 25.7% [496/1,931]; *Journal of the American Society for Information Science and Technology,* 21.2% [409/1,931]; and *Journal of Documentation*, 8.2% [159/1,931])[34] to four (*MIS Quarterly*, 21.6%; *Journal of the American Medical Informatics Association*, 13.5%; *International Journal of Geographical Information Science*, 9.9%; and *Information & Management*, 8.7%—see table 1), the disproportionate distribution of citations among the LIS journals remains. Although *Scientometrics* (3.6%) and *Journal of the American Society for Information Science and Technology* (7.3%) continue to be two of the more often cited journals in the discipline, journals that were not included in the Meyer and Spencer study now command the majority of the other-field citations. Three-fourths (22,321/29,622) of the other-field citations LIS journals received from 1996 to 2004 were to journals not listed in *JCR*'s 1992 "Information Science and Library Science" category and were, therefore, absent from Meyer and Spencer's title list. These new LIS titles included all four of the journals that received over one-half (53.7%) of other-field citations from 1996 to 2004.

Although the other-field citations to LIS journals have increased from 8 percent of all citations in 1984, to 13 percent in 1994,[35] and to 27 percent in 2004,[36] this rise in citations cannot be attributed to the journals used in Meyer and Spencer's analysis. If the citation counts from this study were restricted to the twenty-two titles (see table 5), both included in Meyer and Spencer and indexed by *JCR* after 1995, other-field citations to LIS journals would drop from 27.0 percent (29,622/109,775) of the total citations to 13.7 percent (7,511/54,665). Similarly, if limited to the Meyer and Spencer title list, the ratio of other-field citations to self-citations from 1996 to 2004 would fall from 0.51 (29,622/109,775) to 0.21 (7,511/36,677). Although the ratio of other-field citations to self-citations has improved since Meyer and Spencer established the mark at 0.16 (1,904/12,092), when newer titles are excluded, the per-

TABLE 5
Meyer & Spencer Titles 1971-1994 and 1996-2004

Journal	OF Cites 1972-1994	Self Cites 1972-1994	OF Cites/ Self Cites 1972-1994	% of all OF Cites 1972-1994	OF Cites 1996-2004	Self Cites 1996-2004	OF Cites/ Self Cites 1996-2004	% of all OF Cites to Meyer & Spencer titles 1996-2004
Annual Review of Information Science	28	225	.12	1.5	125	1,208	.10	1.66
British Medical Library Association (now Journal of the Medical Library Association)	89	554	.16	4.7	563	1,936	.29	7.5
College & Research Libraries	45	989	.05	2.4	41	2,471	.02	0.55
Database (now Econtent)	105	662	.16	5.5	110	575	.19	1.46
Information Processing & Management	142	621	.23	7.5	1,498	2,931	.51	19.94
Information Technology and Libraries	14	238	.06	0.7	95	402	.24	1.26
Interlending & Document Supply	7	58	.12	0.4	50	298	.17	0.67
Journal of Academic Librarianship	22	570	.04	1.2	66	1,304	.05	0.88
Journal of the American Society for Information Science and Technology	409	1,473	.28	21.5	2,143	8,510	.25	28.53
Journal of Documentation	159	974	.16	8.4	456	3,554	.13	6.07
Journal of Information Science	104	562	.19	5.5	170	1,522	.11	2.26
Library Acquisitions Practice and Theory (now Library Collections Acquisitions and Technical Services)	1	109	.01	0.1	20	289	.07	0.27
Library and Information Science	1	7	.14	0.1	22	257	.09	0.29
Library & Information Science Research	18	230	.08	0.9	65	946	.07	0.87
Library Journal	59	1,245	.05	3.1	71	1,675	.04	0.95
Library Quarterly	16	207	.08	0.8	33	1,202	.03	0.44

TABLE 5 (continued)
Meyer & Spencer Titles 1971-1994 and 1996-2004

Journal	OF Cites 1972-1994	Self Cites 1972-1994	OF Cites/ Self Cites 1972-1994	% of all OF Cites 1972-1994	OF Cites 1996-2004	Self Cites 1996-2004	OF Cites/ Self Cites 1996-2004	% of all OF Cites to Meyer & Spencer titles 1996-2004
Library Resources & Technical Services	1	253	.00	0.1	22	606	.04	0.29
Online	91	1,110	.08	4.8	111	738	.15	1.48
Program-Electronic Library and Information Systems	4	118	.03	0.2	145	332	.44	1.93
Reference Quarterly (now Reference & User Services Quarterly)	33	1,047	.03	1.7	18	638	.03	0.24
Scientometrics	496	760	.65	26.1	1,077	4,441	.24	14.34
Telecommunication Policy	60	80	.75	3.2	610	842	.72	8.12
Totals:	1,904	12,092	.16		7,511	36,677	.20	

OF = Other Field

centage of all citations that originate in other fields has remained virtually unchanged—from 13.4 percent (1,931/14,378)[37] for Meyer and Spencer's twenty-four titles during the years of 1972 to 1994 and to 13.7 percent (7,511/54,665) for the twenty-two shared titles during the years of this study, 1996 to 2004.

If the influence of LIS scholarship is increasing, the change cannot be attributed to citations received by the twenty-two journals of the Meyer and Spencer study—a list dominated by titles frequently read and cited by authors from the profession of librarianship: *College & Research Libraries*, *Journal of Academic Librarianship*, *Library Quarterly*, and others. These changes, rather, can be attributed to newer titles in the subject category—journals placing less emphasis on librarianship and more emphasis on information technology and information science research. The rising influence of information science journals within the LIS field (as defined by *Journal Citation Reports*) can be roughly observed by contrasting Meyer and Spencer's title list, the twenty-four LIS titles with the greatest *JCR* "Impact Factor" in 1992 to the same "Impact Factor" rankings for the subject category in 2002. In 1992, thirteen of the twenty-four highest ranked LIS journals included some form of the word "library" in their titles; ten years later, that number receded to six.

Limitations and Further Research

The results reported here are confined to *Journal Citation Reports'* title list for the subject category "Information Science and Library Science." *JCR* may include titles

in this list that many LIS scholars would exclude. Likewise, *JCR* does not index other LIS titles—for example, in 2004 the *JCR* titles relevant to the LIS field but not indexed by *JCR* included: *Science & Technology Libraries*, *International Information and Library Review*, *The Serials Librarian*, *Harvard Library Bulletin*, *Library Culture*, *International Journal of Information Technology and Decision Making*, and *Knowledge and Information Systems*. Additionally, many other non-LIS titles are included in *JCR*'s citation counts but are not identified by subject category—from 1996 to 2004, 8.7 percent (9,509/109,775) of citations to LIS journals were from 392 titles with no identified *JCR* subject category.

Further research would be needed to identify which LIS topics are most often exported to other fields or to fully explain why specific non-LIS titles cite the field more than others do. The results reported here could also be clarified by using other citation indexes, by selecting a list of LIS journals without relying on *JCR*'s subject categories, by identifying a core list of LIS articles and topics frequently cited by non-LIS journals, or by identifying the disciplinary affiliations of the cited and citing authors. Additional research is also needed to place these findings in the context of the citation profiles of other Social Science subjects.

Notes

1. This citation data was acquired from the *Journal Citation Reports* (Social Science Edition) subject category "Information Science and Library Science" (ISLS); in this paper, LIS is used interchangeably with ISLS.

2. Clement Y.K. So, "Citation Patterns of Core Communication Journals: An Assessment of the Developmental Status of Communication," *Human Communication Research* 15, no. 2 (1988): 248.

3. Ibid., 244–49.

4. Terry Meyer and John Spencer, "A Citation Analysis Study of Library Science: Who Cites Librarians?" *College & Research Libraries* 57, no. 1 (1996): 31–32.

5. Ibid., 31.

6. In the year 2000, this journal changed its title to *Journal of the American Society for Information Science and Technology*.

7. Meyer and Spencer, "A Citation Analysis Study of Library Science," Table 1, 27.

8. Ibid., 29.

9. According to data in Meyer and Spencer's Table 1 (p. 27), *Scientometrics* and *Journal of the American Society for Information Science* together received a total of 3,138 citations (905 other field citations and 2,233 LIS citations). When these citations are subtracted from Table 1, the LIS titles remaining receive 1,026 other field citations and 10,214 LIS citations. Thus, without these two titles, the percentage of other field citations would fall from 13.4% (1,931/14,378), to 9.1% (1,026/11,240) of the total citations received.

10. Ibid., 25.

11. *JCR* calculates a journal's "Impact Factor" by dividing the total citations received in one year by the number of articles published in the two previous years (*Journal Citation Reports*, 2005).

12. Meyer and Spencer, "A Citation Analysis Study of Library Science," 27.

13. Ibid., 23–33.

14. Eugene Garfield, "Citation Indexes for Science: A New Dimension in Documentation through Association of Ideas," *Science* 122, no. 3159 (1955): 108–11; Anton J. Nederhof, "Bibliometric Monitoring of Research Performance in the Social Sciences and the Humanities: A Review," *Scientometrics* 66, no. 1 (2005): 81–100; Thomas E. Nisonger, "Use of the Journal Citation Reports for Serials Management in Research Libraries: An Investigation of the Effect of Self-citation on Journal Rankings in Library and Information Science and Genetics," *College & Research Libraries* 61, no. 3 (2000): 263–75.

15. Eugene Garfield, "Citation Indexing for Studying Science," *Nature* 227 (1970): 669.

16. Kevin W. Boyack, Richard Klavans, and Katy Börner, "Mapping the Backbone of Science," *Scientometrics* 64, no. 3 (2005): 351–74; Bluma C. Peritz and Judit Bar-Ilan, "The Sources Used by Bibliometrics-Scientometrics as Reflected in References," *Scientometrics* 54, no. 2 (2002): 269–84; Howard D. White and Katherine W. McCain, "Visualizing a Discipline: An Author Co-Citation

Analysis of Information Science, 1972–1995," *Journal of the American Society for Information Science* 49, no. 4 (1998): 327–55.

17. Stephen P. Harter, Thomas E. Nisonger, and Aiwei Weng, "Semantic Relationships between Cited and Citing Articles in Library and Information Science Journals," *Journal of the American Society for Information Science* 44, no. 9 (1993): 544.

18. Henry G. Small, "Paradigms, Citations, and Maps of Science: A Personal History," *Journal of the American Society for Information Science* 54, no. 5 (2003): 394.

19. Chaomei Chen et al., "Visualizing and Tracking the Growth of Competing Paradigms: Two Case Studies," *Journal of the American Society for Information Science* 53, no. 8 (2002): 678–89; Eugene Garfield, A.I. Pudovkin, and V.S. Istomin, "Why Do We Need Algorithmic Historiography?" *Journal of the American Society for Information Science* 54, no. 5 (2003): 400–02.

20. White and McCain, "Visualizing a Discipline," 353.

21. Small, "Paradigms, Citations, and Maps of Science," 398.

22. Denise Koufogiannakis and Linda Slater, "A Content Analysis of Librarianship Research," *Journal of Information Science* 30, no. 2 (2004): 227–39.

23. Robert Grover, Jack Glazier, and Maurice Tsai, "An Analysis of Library and Information Research," *Journal of Educational Media & Library Science* 28, no. 3 (1991): 295–96; Jeffrey N. Gatten, "Paradigm Restrictions on Interdisciplinary Research into Librarianship," *College & Research Libraries* 52 (Nov. 1991): 575–84; Lynne (E.F.) McKechnie and Karen E. Pettigrew, "Surveying the Use of Theory in Library and Information Science Research: A Disciplinary Perspective," *Library Trends* 50, no. 3 (2002): 406–17.

24. John M Budd, "An Epistemological Foundation for Library and Information Science," *Library Quarterly* 65, no. 3 (1995): 295–318; Bill Crowley, "Redefining the Status of the Librarian in Higher Education," *College & Research Libraries* 57, no. 2 (1996): 113–21; Peter Hernon, "Components of the Research Process: Where Do We Need to Focus Attention?" *Journal of Academic Librarianship* 27, no. 2 (2001): 81–89.

25. Julian Warner, "W(h)ither Information Science?" *Library Quarterly* 71, no. 2 (2001): 243–55.

26. In the 2004 *JCR* Science and Social Sciences editions, "Information Science and Library Science" titles were cross-listed in the following subject categories: "Communication," "Computer Science, Information Systems," "Computer Science, Interdisciplinary Applications," "Geography," "Geography, Physical," "Law," "Management," "Medical Informatics," "Multidisciplinary," and "Social Science, Interdisciplinary."

27. Meyer and Spencer, "A Citation Analysis Study of Library Science," 27.

28. "Titles that cite the journal only once are listed in alphabetical order until the total number of citing titles is at least 25; all other titles that cite the journal only once are collected in the ALL OTHERS category" (*Journal Citation Reports*, 2005).

29. A "cited journal," in this case, is an ISLS journal that received one or more citations from a journal belonging to a different subject category—the "citing journal." The term "cited year" refers to the year in which the cited journal receives a citation (the citing journal's publication year)—this often differs from the year in which the cited article was published.

30. *JCR* (*Journal Citation Reports*) listed *Knowledge Acquisition* in the ISLS category for only one year (1996) of this study.

31. *JCR* listed *Internet World* in the ISLS category for only three years (1997–1998, 2000) of this study. Other titles dropped from *JCR*'s list include: *American Archivist* (1996), *Behavioral & Social Sciences Librarian* (1996–2000), *CD-ROM Professional* (1996), *International Forum on Information and Documentation* (1996–1999), *Journal of Education for Library and Information Science* (1996–1997, 1999), *International Information & Library Review* (1996), *Library Hi Tech* (1996–1998), *Special Libraries* (1996–1998), and *Wilson Library Bulletin* (1996–1997). Recently added titles include: *Information Research: An International Electronic Journal* (2004), *Journal of Management Information Systems* (2001–2004), *portal: Libraries and the Academy* (2004), and *Research Evaluation* (2002–2004).

32. Table 6 provides an index of the *JCR* title abbreviations used in this paper.

33. Meyer and Spencer, "A Citation Analysis Study of Library Science," 28.

34. Ibid., Table 1, 26.

35. Clement Y.K. So, "Citation Patterns of Core Communication Journals," 248; Meyer and Spencer, "A Citation Analysis Study of Library Science," 28.

36. See data reported in Figure 1 and Table 1: 29,622 Other Field Cites/109,775 Total Cites; 27%.

37. Meyer and Spencer, "A Citation Analysis Study of Library Science," 26.