

2010

# Highly Cited Articles in Library and Information Science: An Analysis of Content and Authorship Trends

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## Recommended Citation

Blessinger, Kelly D. and Hrycaj, Paul, "Highly Cited Articles in Library and Information Science: An Analysis of Content and Authorship Trends" (2010). *Faculty Publications*. 5.

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## Highly cited articles in library and information science: An analysis of content and authorship trends

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### ABSTRACT

Thirty-two highly cited articles that were influential to scholarly communication in library and information science (LIS) in the latter part of the twentieth century are identified and examined. Journal distributions, major subject themes, and authorship characteristics of these articles are discussed and compared to the majority of scholarly articles published in LIS during the same time period.

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### 1. Introduction

The concept of the journal impact factor was developed in the late 1950s and early 1960s as a measure of the degree to which particular journals are cited in articles. As journal impact factor is now defined, the impact factor for a journal is a ratio based on the previous two years of citation data. So, for example, the 2009 impact factor for a journal would be calculated by dividing the number of 2009 articles in journals that reference citable articles published in that journal in 2007 and 2008 divided by the number of all citable articles published in that journal in 2007 and 2008 (Banks & Dellavalle, 2008). If a journal is cited very frequently in the literature relative to the number of articles published in it, then it has a high impact factor. Though there is some controversy as to the accuracy of using journal impact factor as a measure of the quality of a journal, it is still commonly considered as such. As one of the co-creators of the journal impact factor, Eugene Garfield, stated, “As a general rule, the journals with high impact factors include the most prestigious. Some would equate prestige with high impact” (Garfield, 2006, p. 92).

The concept of impact factor can be extended to apply to journal articles themselves, the idea being that the more a journal article is cited by other articles, the greater its impact. Indeed, Garfield appears to have applied the idea of impact factor to journal articles before he applied it to journals. In discussing the idea of a citation index in his ground-breaking 1955 paper, he said:

“[in] effect, the system would provide a complete listing, for the publications covered, of all the original articles that had referred to the article in question. This would clearly be particularly useful in historical research, when one is trying to evaluate the significance of a particular work and its impact on the literature and thinking of the period. Such an ‘impact factor’ may be much

more indicative than an absolute count of the number of a scientist’s publications....” (Garfield, 1955, p. 1124).

While the concept of impact factor has primarily been applied to journals since this paper was published, a number of researchers have been interested in studying the characteristics of “highly cited” journal articles, particularly in the “hard” sciences.

### 2. Problem statement

A number of studies in the library and information science (LIS) literature have as their subject the LIS literature itself. These studies often select a manageable sample of the LIS literature, using such parameters as time period or subject, and then analyze that sample. Such analyses provide the ability to discover the characteristics of their samples, such as author attributes and subject distribution. This provides general information about the discipline of LIS, such as the issues on which its practitioners are focusing and doing research. Having such samples of the LIS literature raises the idea of studying the works cited in the bibliographies of the items that compose those samples.<sup>1</sup>

A study of the works frequently cited in the bibliographies of a statistically significant, general (i.e. not subject specific) sample of the LIS literature would provide information about the works that captured the attention of and influenced that sample’s contributors. Such works could be considered to have a high impact factor similar to the way some journals are considered high impact journals. The list of these works would be something approaching a “must read” list of works in LIS. While it is extremely difficult to be well versed in the voluminous literature of LIS, a list of highly cited works would provide students and practitioners of LIS with a way to focus on, at least by one measure, the highly significant and influential works and authors in LIS for a particular period of time. An analysis of the most frequently

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<sup>1</sup> This type of citation analysis has occasionally been done in subject areas other than LIS, usually in the hard sciences.

cited works in these bibliographies could provide valuable information about the literature of LIS and the discipline itself. Analyzing the subjects of these highly cited works would similarly indicate the high impact subjects in the LIS literature for a particular period of time. Also, noting the journals publishing these highly cited articles would provide another measure for high impact journals, in this case, those journals in which the highly influential papers of a particular period of time are published. It appears, though, that there are currently no examples in the LIS literature of a study of the citations of a statistically significant, general sample of the LIS literature.

The current study, in analyzing the citations in the bibliographies of a statistically significant, general sample of the LIS literature, provides information about high impact journal articles of 1994 to 2004, i.e., articles that captured the greatest interest of the researchers who contributed to the LIS literature in this time period. Knowing the subject areas and other general characteristics of highly cited journal articles should be useful to researchers and students of LIS, who might want to use highly cited articles as models and guides for their own research.

### 3. Research questions

The main research questions addressed in this study were:

- 1) What are the most highly cited journal articles in the LIS works of 1994 to 2004, and what are some of the general characteristics of the authors of these articles?
- 2) Among the most highly cited works of 1994 to 2004, are these works evenly distributed between a number of journals, or are they concentrated in only a few, and if so, which are these journals?
- 3) What subject areas do the highly cited articles of 1994 to 2004 focus on, if any? How does this distribution of subjects compare with that of the literature overall of this period of time?

### 4. Literature review

Some studies, while analyzing the LIS literature, have as their primary focus the *authors* of works in the LIS literature. For instance, (Aina & Mooko, 1992) examined the papers in *Library & Information Science Abstracts* to identify the top researchers in LIS in Africa. (Weller, Hurd, & Wiberley, 1999) focuses specifically on academic librarians' publication patterns. Adkins and Budd (2006) look at LIS educators in the US and their scholarly productivity. (Adkins & Budd, 2006) An interesting feature of this work is that it begins with an identification of LIS faculty members through a directory, and then used the *Social Science Citation Index (SSCI)* to find works published by these particular authors, rather than beginning with the literature to identify authors of interest.

Adkins and Budd not only identified the works authored by LIS faculty members, but also identified the works that cite the works of these faculty members, in order to determine which LIS faculty members are the most highly cited in the LIS literature.

Studies that examine the bibliographic characteristics (or meta-data) of a group of works in the LIS literature such as (Blessinger & Frasier, 2007) can be considered to be first level, and those that identify a group of works in the LIS literature and examine the citations made in these works (such as the current study) can be considered to be second level. This might be viewed as analogous to studies of the characteristics of, say, a particular group of people identified by some criteria (first level) as opposed to studies of the characteristics of the *parents* of a particular group of people identified by some criteria (second level). Since Adkins and Budd (2006) looked not only at the bibliographic characteristics of works in the LIS literature but also at citations to other works made in works in the LIS literature, their research includes some second-level analysis as well as first level analysis.

A number of studies analyze the content and other features of the LIS literature itself. These studies typically use a time frame of the LIS

literature as their controlling parameter. Foreexample, (Feehan, Lee Gragg II, Havener, & Kester, 1987) analyzed the content and analytic techniques of papers in the LIS literature of 1984. (Järvelin & Vakkari, 1990) reported on a content analysis of research articles in LIS. (Buttlar, 1991) looked at some of the author characteristics as well as the content of the LIS literature, focusing on the period from 1987 to 1989, while (Atkins, 1988) studied a larger range of years, 1975–1984. More recent work includes (Koufogiannakis, Slater, & Crumley, 2004), who focuses solely on 2001, and Blessinger and Frasier's (2007) study of the LIS literature of 1994 to 2004. All of these studies remain at the first level of analysis, i.e., none directly examines the citations or works cited in the bibliographies of a group of works from the LIS literature.

Some studies use subject content to demarcate the sample of interest. For instance, Crawford and Feldt cover a large time span (1971–2002), but focus solely on works about instruction in academic libraries, and there is no examination of the bibliographies of the works in this study. (Crawford & Feldt, 2007) A special section in the journal *Library Administration & Management* identifies required reading for library administrators, with a two-part list, one dealing with management works that are highly cited in LIS papers published between 1987 and 2000 but are not themselves part of the LIS literature (Required reading for library administrators: An annotated bibliography of influential authors and their works, 2002) and the other with highly cited management works published in this time period that can be considered part of the LIS literature (Required reading for library administrators, Part two: An annotated bibliography of highly cited library and information science authors and their works (2003)). This project does go into second-level research, using as its primary focus the bibliographies of articles culled from the LIS literature. Unlike the current study, the highly cited papers in this project focus solely on the management subject area, and the result of the study is basically an annotated bibliography, not an analysis.

Second-level literature analyses are not uncommon in the scientific literature. For example, (Aksnes, 2003) studied various characteristics of papers highly cited in Norwegian scientific papers published between 1981 and 1996. Allen, Jacobs, and Levy identified a core group of journals in the subject area of nursing and studied the citation characteristics of the articles in these journals for a five-year period. (Allen, Jacobs, & Levy, 2006) Csako identified and analyzed the most highly cited articles of the journal *Clinica Chimica Acta* in its 50-year history from 1956 to 2005, looking at such characteristics of as geographical distribution and publication category (Csako, 2007). The current study combines the approach of these second-level studies to the LIS literature, though by using as its starting point the articles in a core group of journals, its methodology most closely resembles that of Allen et al. (2006).

### 5. Procedures

Blessinger and Frasier (2007), using criteria to identify highly regarded journals in the area of library and information science, developed a list of 28 journals. The criteria included first consulting Thomson's *Journal Citation Reports (JCR)* Social Science Edition to ascertain the journals of high repute within library and information science. Fifty-five journals appeared in the category of library and information science in *JCR* in 2003. *Ulrich's Periodicals Directory* was then consulted to ensure that the journals had the designation of library and information sciences as a subject descriptor. This was done in an effort to eliminate the journals that focused mainly on information science. *Ulrich's* was also used to determine that the journals were indexed in both the *Library Literature* and the *SSCI* databases for the 10-year study period. The 28 journals that met these criteria are listed in Table 1 and are sorted by the 2008 current impact factor ranking. From the list of 28 journals, 10 were randomly selected for inclusion in the study; these journals are highlighted in Table 1. In 2003, the impact factor of the 28 journals listed in the table averaged

**Table 1**

Library and information science journals that met Blessinger and Frasier (2007) criteria. Sorted by impact factor in 2008 with those journals used in the study highlighted.

Title	Impact factor 2008
JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE AND TECHNOLOGY	1.954
JOURNAL OF GOVERNMENT INFORMATION	1.91
INFORMATION PROCESSING & MANAGEMENT	1.852
JOURNAL OF DOCUMENTATION	1.712
JOURNAL OF THE MEDICAL LIBRARY ASSOCIATION	1.669
JOURNAL OF INFORMATION SCIENCE	1.648
LIBRARY & INFORMATION SCIENCE RESEARCH	1.226
ONLINE INFORMATION REVIEW	1.103
COLLEGE & RESEARCH LIBRARIES	0.781
INFORMATION TECHNOLOGY AND LIBRARIES	0.703
LIBRARY RESOURCES & TECHNICAL SERVICES	0.698
JOURNAL OF ACADEMIC LIBRARIANSHIP	0.667
JOURNAL OF LIBRARIANSHIP AND INFORMATION SCIENCE	0.562
ASLIB PROCEEDINGS	0.493
INTERLENDING & DOCUMENT SUPPLY	0.484
KNOWLEDGE ORGANIZATION	0.429
LIBRARY JOURNAL	0.388
LIBRARY QUARTERLY	0.364
LIBRARY COLLECTIONS ACQUISITIONS & TECHNICAL SERVICES	0.364
REFERENCE & USER SERVICES QUARTERLY	0.339
LAW LIBRARY JOURNAL	0.296
LIBRARY TRENDS	0.239
RESTAURATOR INTERNATIONAL JOURNAL FOR THE PRESERVATION OF LIBRARY AND ARCHIVAL MATERIAL	0.172
LIBRI	0.156
LIBRARY AND INFORMATION SCIENCE	0.133
ZEITSCHRIFT FUR BIBLIOTHEKSWESSEN UND BIBLIOGRAPHIE	0.019
CANADIAN JOURNAL OF INFORMATION AND LIBRARY SCIENCE	0
INFORMATION - WISSENSCHAFT & PRAXIS: NFD	N/A

.542. A random sample of 10 influential journals was thought to be representative of the trends of the literature as a whole during this time period, while also helping to keep the study at a manageable size. The 10 journals had an average impact factor of .604, slightly above the mean. Each journal was searched both in *Library Literature* and *SSCI* for the 10-year period of 1994 to 2004. Searches were limited strictly to journal articles, to eliminate items such as book reviews, editorials, bibliographies, letters to the editor, etc. This resulted in a pool of 2220 articles. While *SSCI* was used for the citation analysis of these articles, the subject analysis was determined using the subjects listed in the indexing for *Library Literature*, as the subjects within the *Library Literature* database are much more detailed and consistent than those in *SSCI*. This analysis provided insight as to the subject trends, authorship, and basic citation trends during this ten year period.

Blessinger and Frasier's (2007) sample was used for the current study, which reviews the journal articles that were frequently cited by the works in this sample and analyzes them for their content and author characteristics and provides a list of those articles categorized by subject.

The bibliographies from the articles in the sample were downloaded and citations were edited for consistency and imported into MS Access™ for further analysis. If the information did not include all of the required fields such as author, cited year, and source, the

citations were deleted. The group of deleted citations represented a small percentage of the total citations. The final list contained 47,389 citations. Books were excluded from this study in an effort to focus on highly cited journal articles. Articles cited at least 10 times by the articles in the original sample were selected, and totaled 63. These 63 articles were then searched in *SSCI* to determine which of them were cited in the database at least 50 times. The first criterion of being cited at least 10 times identified articles that had a strong impact on these articles and were also LIS-focused. The second criterion of then being cited at least 50 times in *SSCI* identified those articles that also had a strong impact on journals outside LIS. The 32 journal articles which met these criteria are referred to in this study as *highly cited*.

The subjects of the highly cited articles were evaluated using the same criteria as Blessinger and Frasier (2007) to allow for comparison of the two data sets. The subject analysis was determined using the subjects listed in the indexing for *Library Literature*. *Library Literature* and other Wilson databases use the Library of Congress subject headings as a model, somewhat loosely. *Library Literature* creates new subject headings much more often than the Library of Congress because of the narrower scope of periodicals and because new ideas usually appear first in the periodical literature before they appear in books. (Gauthier, personal communication, May 2004) If any of the resulting highly cited articles did not have subjects provided by *Library Literature*, they were assigned to subject category of by the researchers. The subjects gleaned from *Library Literature* were divided into 43 possible major subjects that fell under five general categories: library operations, library/information science profession, publishing/publishing studies, research in librarianship/users, and technology (see Appendix A for a full list of subject categories and articles).

## 6. Results

The 32 highly cited articles were published between 1968 and 2000, with 1991 being the median year. The majority of the authors of the highly cited articles had one highly cited article. David Ellis, Peter Ingwersen, and T.D. Wilson had two highly cited articles in this study, and Carol Kuhlthau had three. Two journals published close to 70% of the highly cited articles: *Journal of the American Society for Information Science* (38%) and the *Journal of Documentation* (31%). The remaining nine journals all had one highly cited article except for *College and Research Libraries*, which had two (6%).

31% of the highly cited articles were written by more than one author, and the highly cited articles had an average of fifty-five references. The vast majority of the first authors of the highly cited articles were members of college or university faculties. These scholars were predominately in LIS (70%), although six (22%) were from information science departments, and one from communication studies. The authors of highly cited works who were not college or university faculty members were consultants (6%), directors of institutes (6%) or researchers (3%). There was not a single practicing librarian represented among the authors of the 32 highly cited articles.

Two subject categories were dominant: research in librarianship/users (68%) and technology (22%). A low number of the highly cited articles in this study focused on library operations (8%), library/information science profession (2%), or publishing/publishing studies (2%) (percentages were rounded to the nearest whole number).

## 7. Discussion

A comparison of the characteristics of the Blessinger and Frasier (2007) sample with the highly cited articles highlights the differences between the characteristics of a sample of literature with those of the journal articles that most strongly influenced the works in that sample. For example, in Blessinger and Frasier, 54% of the 2200 articles studied were co-authored with one or more collaborators. In

comparison, only 31% of the highly cited articles were written as a collaborative effort. While co-authorship was long thought to improve the quality of scholarly publications, these results are in agreement with Hart, who studied two highly regarded journals in academic librarianship for citation trends and found “no compelling evidence that co-authored articles are of higher quality as measured by rates of citation” (Hart, 2007, p. 194).

As noted above, the vast majority of the first authors of the highly cited articles were members of college or university faculties, representing 84% of the total. This is the case even though previous studies have indicated that the bulk of articles in the LIS literature are published by practicing librarians, particularly academic librarians (Wiberley, Hurd, & Weller, 2006; Yerkey, 1993). Also, the highly cited articles contained a much larger number of references than the average LIS article published between 1994 and 2004. The average number of references used in the 2200 articles in the Blessinger and Frasier (2007) study was 21, while the highly cited articles had an average of 55 references, representing 62% more.

As is evident in Fig. 1, the LIS articles in the original study had a more even distribution across the subject categories than those in the current study. While Blessinger and Frasier (2007) indicated that the majority of the articles reviewed in that study focused on practical matters facing the profession, a low number of the highly cited articles

in the current study focused on library operations (8%), Library/information science profession (2%), or publishing/publishing studies (2%). It appears that articles that are highly cited largely focus on different subjects than the majority of general LIS articles. Most of the highly cited articles involved user studies and covered subjects such as information retrieval and library and information science theory. Other significant topics included information behavior (defined as “those activities a person may engage in when identifying his or her own needs for information, searching for such information in any way, and using or transferring that information,” (Wilson, 1999, p. 249), and users’ emotional states in relation to the library and research. The majority of articles in the technology category discussed the design of the user interface in relation to observations of groups of users.

There seem to be two ways to explain the difference in subject distribution between the two groups of papers. One is that the citing done by articles in certain topics was less diverse (or less “spread out”) than in other topical areas. For instance, the citation activity of articles in research in librarianship might have clustered around certain papers (the highly cited papers), whereas the articles in library operations did not cluster around certain papers as much. Perhaps some of the papers in research in librarianship were particularly groundbreaking or interesting, so that researchers read these papers and were inspired to write on the same topic, which would, of course,

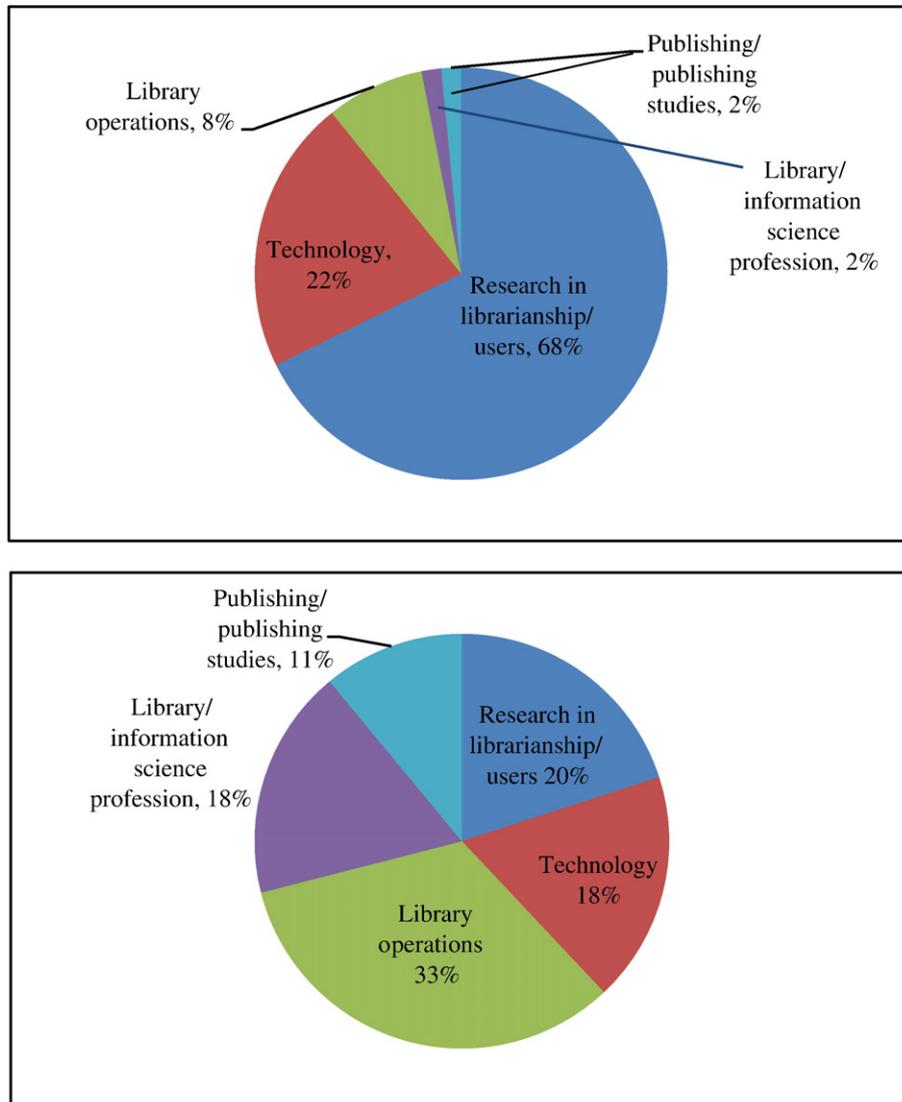


Fig. 1. Comparison of subject categories in highly cited articles vs. average articles published in the field (1994–2004). Thirty-two highly cited articles in LIS publications during 1994–2004. Average articles published in the field 1994–2004.

require citing the papers that inspired them. It is also possible that certain papers cross subject lines more easily than others. That is, if articles in research in librarianship did not cite papers in library operations, but articles in library operations did cite papers on research in librarianship, then this could also account for the difference in subject distribution between the two article groups. Perhaps certain articles in research in librarianship have broader applications than those in library operations. Aksnes discusses this idea of the “ability of a paper to be cited by adjacent fields as well as its own” Though not attempted in this study, it would be an interesting to determine how many highly cited papers in a specific topic area in LIS are cited by papers in different topic areas (Aksnes, 2003, p. 166).

Some limitations of this study should be noted. To maintain manageability of the sample of the LIS literature under review in Blessinger and Frasier (2007), the authors focused on the articles from only 10 journals. While these were randomly selected, the number of the original pool is small enough that the selected journals might be skewed toward a particular subject area of LIS, such as technology or library operations, and might not be truly representative of the overall library literature.

Another point is that the citation data used in the original study come from SSCI, and it has been noted by some authors (Budd, 2000; Nisonger, 2004) that SSCI does not take into account citation data from books, web documents, and non-SSCI journals, and these can skew results of any study based on SSCI data. The current study is affected by this limitation, though it is impossible to say at this point whether the inclusion of these other citation sources would have had a significant effect on the results.

Some researchers have called into question the notion of inferring journal quality from journal impact factor, and by extrapolation, inferring journal article quality where journal selection is based on impact factor. Seglen (1997) provides a list of 21 problems with making this inference, and Banks and Dellavalle (2008) also identify problems with this inference of quality. (Seglen, 1997).

## 8. Conclusion

The highly cited journal articles identified in this study can provide students and researchers of LIS with a must-read list of articles. Furthermore, the high citation rate and subject distribution of the highly cited articles identified in this study can be used by students and researchers of LIS to focus their research interests (e.g. the subject areas of technology and research in librarianship/users), since it is likely that some students and researchers would want to align their work with the work that has had the most impact on a recent decade of the LIS literature. Similarly, these results might lead LIS researchers to focus their publication submissions on the journals that published the greatest number of highly cited articles, the *Journal of the American Society for Information Science* and the *Journal of Documentation*.

The study also leaves us with several questions for further research. Why is the subject distribution of the highly cited papers so different from that of the general LIS literature for the time period in question? Two possible explanations for this were suggested, one concerning the spread of citations of papers in certain subject areas and the other considering the idea that papers in certain subject areas cross subject boundaries more easily than those of other subject areas. Further research might indicate whether one of these explanations or a combination of both explains the discrepancy between the subject area distributions. Another interesting point is that collaboration does not appear to be a significant contributing factor for the LIS highly cited papers, while, according to Aksnes, 2003, highly cited papers in the sciences typically have many authors. Is there a difference between papers in LIS and those in the hard sciences relating number of authors to likelihood as to whether a paper will be highly cited?

This study offers benchmarks for future research, in particular, to encourage the determination of highly cited articles and their charac-

teristics in the LIS literature in the future and to compare those findings to those of the current study to explore changes in characteristics of the LIS literature and the LIS field itself. Will academics continue to dominate as authors of highly cited LIS papers? Will there be any significant changes in the subject distribution of highly cited papers in the LIS literature? This paper has laid the groundwork for future studies of these issues.

## Appendix A. Categories, subjects, and highly cited articles by year in specific categories

Double asterisks (\*\*) identify articles that were not indexed by *Library Literature* and were assigned to subject and category by the authors.

Percentages in the tables were calculated based on the total number of subjects covered in articles (65). All percentages have been rounded to the nearest whole number.

### A.1. Research in librarianship/users

**Table A1**

Distribution of subjects.

Category		
Research in librarianship/users	68%	
Subjects within Category	% of category	% of total
Information retrieval	27%	18%
Library/information issues (theoretical)	20%	14%
User studies	20%	14%
Information needs	16%	11%
Research methods	11%	8%
Library/information science research	2%	2%
Research in librarianship	2%	2%

### Highly cited articles

\*\*Taylor, R. S. (1968). Question negotiation and information seeking in libraries. *College & Research Libraries*, 29, 178–94.

\*\*Saracevic, T. (1975). Relevance: Review of and a framework for thinking on notion in information-science. *Journal of the American Society for Information Science*, 26, 321–43.

\*\*Wilson, T. D. (1981). On user studies and information needs. *Journal of Documentation*, 37, 3–15.

\*\*Belkin, N. J., Oddy, R. N., & Brooks, H. M. (1982). Ask for information retrieval.1: Background and theory. *Journal of Documentation*, 38, 61–71.

\*\*Stone, S. (1982). Humanities scholars: Information needs and uses. *Journal of Documentation*, 38, 292–313.

Borgman, C. L. (1986). Why are online catalogs hard to use: Lessons learned from information-retrieval studies. *Journal of the American Society for Information Science*, 37, 387–400.

Dervin, B., & Nilan, M. (1986). Information needs and uses. *Annual Review of Information Science and Technology*, 21, 3–33.

Mellon, C. A. (1986). Library anxiety: A grounded theory and its development. *College & Research Libraries*, 47, 160–165.

Kuhlthau, C. C. (1988). Developing a model of the library search process: Cognitive and affective aspects. *RQ*, 28, 232–242.

Ellis, D. (1989). A behavioural approach to information retrieval system design. *Journal of Documentation*, 45, 171–212.

*\*Included also in Technology*

Buckland, M.K. (1991). Information as thing. *Journal of the American Society for Information Science*, 42, 351–360.

Larson, R. R. (1991). The decline of subject searching: Long-term trends and patterns of index use in an online catalog. *Journal of the American Society for Information Science*, 42, 197–215.

*\*Included also in Technology*

Kuhlthau, C. C. (1991). Inside the search process: Information seeking from the users perspective. *Journal of the American Society for Information Science*, 42, 361–371.

Ellis, D., Cox, D. & Hall, K. (1993). A comparison of the information seeking patterns of researchers in the physical and social sciences. *Journal of Documentation*, 49, 356–369.

Kuhlthau, C. C. (1993). A principle of uncertainty for information-seeking. *Journal of Documentation*, 49, 339–355.

Solomon, P. (1993). Children's information-retrieval behavior: A case analysis of an OPAC. *Journal of the American Society for Information Science*, 44, 245–264.

*\*Included also in Technology, Library operations, and Library/information science profession*

Barry, C. L. (1994). User-defined relevance criteria: An exploratory study. *Journal of the American Society for Information Science*, 45, 149–159.

Hjorland, B., & Albrechtsen, H. (1995). Toward a new horizon in information science: Domain analysis. *Journal of the American Society for Information Science*, 46, 400–25.

Savolainen, R. (1995). Everyday life information seeking: Approaching information seeking in the context of way of life. *Library & Information Science Research*, 17, 259–294.

Ingwersen, P. (1996). Cognitive perspectives of information retrieval interaction: Elements of a cognitive IR theory. *Journal of Documentation*, 52, 3–50.

Leckie, G. J., Pettigrew, K. E., & Sylvain, C. (1996). Modeling the information seeking of professionals: A general model derived from research on engineers, health care professionals, and lawyers. *Library Quarterly*, 66(2), 161–93.

\*\*Lawrence, S. & Giles C.L. (1999). Accessibility of information on the Web. *Nature*, 400, 107–109.

*\*Included also in Technology*

Wilson, T. D. (1999). Models in information behaviour research. *Journal of Documentation*, 55, 249–270.

Jansen, B. J., Spink, A., & Saracevic, T. (2000). Real life, real users, and real needs: A study and analysis of user queries on the Web. *Information Processing & Management*, 36, 207–227.

A.2. Technology

**Table A2**

Distribution of subjects.

Category		
Technology	22%	
Subjects within category	% of category	% of total
Information science	29%	6%
Internet	29%	6%
Automation	14%	3%
Indexes/databases	14%	3%
Electronic publishing	7%	2%
Software	7%	2%

Highly cited articles

Bates, M. J. (1989). The design of browsing and berrypicking techniques for the online search interface. *Online Review*, 13, 407–424.

Ellis, D. (1989). A behavioural approach to information retrieval system design. *Journal of Documentation*, 45, 171–212.

*\*Included also in Research in librarianship/users*

Marchionini, G. (1989). Information-seeking strategies of novices using a full-text electronic encyclopedia. *Journal of the American Society for Information Science*, 40, 54–66.

Larson, R. R. (1991). The decline of subject searching: Long-term trends and patterns of index use in an online catalog. *Journal of the American Society for Information Science*, 42(3), 197–215.

*\*Included also in Research in librarianship/users*

Solomon, P. (1993). Children's information-retrieval behavior: A case analysis of an OPAC. *Journal of the American Society for Information Science*, 44, 245–264.

*\*Included also in Research in librarianship/users, Library operations, and Library/information science profession*

Ingwersen, P. (1998). The calculation of Web impact factors. *Journal of Documentation*, 54, 236–243.

Fidel, R., Davies, R. K., Douglass, M. H., Holder, J. K., Hopkins, C. J., Kushner, E. J. ... Toney, C.D. (1999). A visit to the information mall: Web searching behavior of high school students. *Journal of the American Society for Information Science*, 50, 24–37.

\*\*Lawrence, S. & Giles C.L. (1999). Accessibility of information on the Web. *Nature*, 400, 107–109.

*\*Included also in Research in librarianship/users*

A.3. Library operations

**Table A3**

Distribution of subjects.

Category		
*Library operations	8%	
Subjects within Category	% of category	% of total
Library/information issues (practical)	40%	3%
Administration	20%	2%
Cataloging	20%	2%
User instruction/education	20%	2%

\*Additional subjects in this category that had no representation in the highly cited literature include acquisitions, circulation, collection development, communications, disability services, indexing/abstracting, interlibrary loan, library environment, library finance, library staff, public relations, and reference/information services.

Highly cited articles

\*\*Orr, R. H. (1973). Measuring the goodness of library services: General framework for considering quantitative measures. *Journal of Documentation*, 29, 315–332.

\*\*Star, S.L., & Griesemer, J.R. (1989). Institutional ecology, translations and boundary objects: Amateurs and professionals in Berkeley's Museum of Vertebrate Zoology, 1907–39. *Social Studies of Science*, 19, 387–420.

*\*Included also in Library/information science profession*

Harter, S. P. (1992). Psychological relevance and information science. *Journal of the American Society for Information Science*, 43, 602–615.

Solomon, P. (1993). Children's information-retrieval behavior: A case analysis of an OPAC. *Journal of the American Society for Information Science*, 44, 245–264.

*\*Included also in Research in librarianship/users, Technology, and Library/information science profession*

A.4. Library/information science profession

**Table A4**

Distribution of subjects.

Category		
*Library/information science profession	2%	
Subjects within Category	% of category	% of total
Children's libraries/materials	50%	2%
Special collections/libraries	50%	2%

\*Additional subjects in this category that had no representation in the highly cited literature include academic/research libraries, archives/preservation, associations/committees, library/information networks, librarianship/professional issues, LIS education, and public libraries.

### Highly cited articles

\*\*Star, S.L., & Griesemer, J.R., (1989) Institutional ecology, translations and boundary objects: Amateurs and professionals in Berkeley's Museum of Vertebrate Zoology, 1907–39. *Social Studies of Science*, 19, 387–420.

\*Included also in *Library operations*

Solomon, P. (1993). Children's information-retrieval behavior: A case analysis of an OPAC. *Journal of the American Society for Information Science*, 44, 245–264.

\*Included also in *Research in librarianship/user, Technology, and Library operations*.

### A.5. Publishing/publishing studies

**Table A5**

Distribution of subjects.

Category			
*Publishing/publishing studies	2%		
Subjects within category	% of category		% of total
Bibliometrics	100%		2%

\*Additional subjects in this category that had no representation in the highly cited literature include literature evaluation, monographic publications, publishing/publishers, and serials.

### Highly cited article

MacRoberts, M. H., & MacRoberts, B. R. (1989). Problems of citation analysis: A critical review. *Journal of the American Society for Information Science*, 40, 342–349.

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