Library and Information Science Research Areas: Analysis of Journal Articles in Lisa

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The main fields of research in Library Science and Documentation are identified by quantifying the frequency of appearance and the analysis of co-occurrence of the descriptors assigned to 11,273 indexed works in the *Library and Information Science Abstracts* (LISA) database for the 2004–2005 period. The analysis made has enabled three major core research areas to be identified: *World Wide Web, Libraries* and *Education.* There are a further 12 areas of research with specific development, one connected with the *library sphere* and another 11 connected with the World Wide Web and Internet: *Networks, Computer Security, Information technologies, Electronic Resources, Electronic Publications, Bibliometrics, Electronic Commerce, Computer applications, Medicine, Searches* and *Online Information retrieval.*

Introduction

The emergence of Documentation is closely linked to Library Science and librarianship, the creation of the International Institute of Bibliography being a significant milestone in its conceptualization process (Rayward, 1997). The start of scientific research into Documentation goes back to the 1930s in the United States, with the social institutionalisation of the discipline. A decisive step in this process was the University of Chicago and the Carnegie Corporation's endeavor which created the Graduate Library School, where the first doctorate program was created, assuming the need to establish the paradigm of a new science—"Library Science"—as well as the furtherance of research. There, they started to publish *The Library Quarterly*, considered to be

the top scientific journal in the area (Norman, 1988). After the Second World War there was sustained growth in Documentation, with the foundation of numerous research institutes, the extension of doctorate programs, the investment of public and private funds in research, the creation of specific databases, and a multiplication of the number of journals in the field (Burke, 2007). In other countries, the process of institutionalization and development of scientific research in the discipline has been much slower and later, very irregular, and, to a large extent, not satisfactorily completed (Delgado López-Cózar, 2002).

This study sets out to learn the recent trends in research in Library and Information Science with the aim of providing researchers, teachers, professionals, students, and anyone interested with an updated view of the main spheres of research in the area. To this end, a thematic analysis is made of the descriptors included in the bibliographic records indexed in the Library and Information Science Abstracts (LISA, 2006) database during the 2004–2005 period.

Materials and Methods

All the works from the 2004-2005 period compiled in the LISA database were selected by executing a search profile through the CSA Illumina Web information platform, which enabled the set of works corresponding to this period to be recovered. The "publication year" field was used for the search (PY = 2004 OR PY = 2005). The results obtained (n = 25,027) were restricted to the "arbitrated works" (n = 13,742), which constitutes a quality criterion for the research, also eliminating book summaries (n = 2,469), and thus meaning that 11,273 works were selected for performing the study. The date on which the search was made was September 30, 2006.

A count of the absolute frequency of the descriptors was made as well as an analysis of their co-occurrence.

For this purpose, an algorithm was applied enabling any descriptors with a frequency of co-occurrence or joint appearance under 30 in the documents to be eliminated, with a view to focusing the analysis on the most intense relationships and allowing a clear vision of the network. The Kamada-Kawai algorithm was used for constructing the network of relations between the descriptors and making the spatial distribution of these. Microsoft Access and Pajek programs were used to carry out these processes (Batagelj & Mrvar, 2001).

Results

The papers analyzed were indexed with 6,994 different descriptors, 5.37 being the average number of descriptors assigned to the documents (range 1 to 17, SD = 2.24). Table 1

TABLE 1. Absolute frequency of key words in papers indexed in the LISA database (2004-2005).

Key word	Fr.	Key word	Fr.	Key word	Fr.
1. World Wide Web	892	51. Bibliometrics	213	101. Cataloguing	105
2. Computer applications	736	52. Educational technology	212	102. Business information	105
3. Online information retrieval	686	53. Social aspects	206	103. Acquisitions	104
4. Medicine	622	54. Teaching	203	104. Routing	104
5. Networks	620	55. Library management	197	105. Case studies	103
6. University libraries	598	56. Archives	194	106. Data mining	103
7. Surveys	567	57. Citation analysis	192	107. Bibliographies	102
8. Searching	520	58. Expert systems	186	108. Privacy	101
9. Internet	506	59. Librarianship	185	109. Children's books	100
10. Evaluation	492	60. Preservation	183	110. Music	100
11. Electronic media	473	61. Inf. seeking behaviour	183	111. Protocols	100
12. Users	453	62. Distance learning	174	112. Children	99
13. Periodicals	455	63. Collection development	172	113. Reference work	97
14. Web sites	434	64. Electronic commerce	171	114. Digitization	97
15. Students	428	65. Library staff	170	115. Attitudes	96
16. Information technology	424	66. Books	169	116. Transactions	95
17. Information communication	418	67. Computer security	167	117. Online payment	94
18. Libraries	417	68. Science and technology	164	118. National libraries	93
19. Health care	415	69. Librarians	163	119. Conferences	93
20. Public libraries	411	70. Government information	162	120. Electronic money	93
21. Library materials	389	71. Business	161	121. Databases	92
22. Education	370	72. Design	156	122. Standards	89
23. Academic libraries	368	73. Scholarly publications	156	123. Portals	89
24. Artificial intelligence	362	74. Authors	154	124. Comparative studies	88
25. Articles	351	75. Library and Inf. Science	152	125. User needs	87
26. Research	321	76. Use	150	126. Research methods	86
27. Digital libraries	317	77. Online databases	144	127. Collaboration	83
28. Information work	317	78. Universities	139	128. Scholarly communication	82
29. Computer assisted instruction	316	79. Companies	131	129. Consumer health inf.	81
30. Publishing	315	80. Electronic publishing	130	130. Pharmaceutics	80
31. User surveys	309	81. Metadata	129	131. National policies	80
32. Cooperation	299	82. Medical libraries	128	132. User behaviour	78
33. Mobile communications	289	83. Search engines	125	133. Full text databases	77
34. Wireless communications	286	84. Faculty	123	134. Links	76
35. User interface	283	85. Organizations	121	135. Usability	76
36. User training	281	86. Computerized inf. Storage and ret.	120	136. Cultural heritage	75
37. Access to information	278	87. Copyright	119	137. Education activities	73
38. Knowledge management	274	88. Curricula	119	138. Technical writing	73
39. Library technology	267	89. Telecommunications	115	139. Multimedia	73
40. Human-computer interaction	264	90. Political aspects	113	140. XML	73
41. History	258	91. Mathematical models	113	141. Role	71
42. Law	252	92. Online reference work	112	142. Theories	70
43. Performance measures	250	93. Future developments	111	143. Finance	69
44. Software	228	94. Software engineering	111	144. User satisfaction	69
45. Computers	226	95. Online inf. storage and ret.	110	145. Computer science	68
46. Models	224	96. Open Access	110	146. Cultural aspects	65
47. Communications technology	222	97. Mass media	107	147. Higher education	65
48. School libraries	221	98. Economic aspects	106	148. Discussion groups	65
49. Electronic periodicals	221	99. Classification	106	149. Reading promotion	64
50. Information literacy	217	100. Professional education	106	150. Newspapers	64

Note: Fr.: Frecuency; Inf.: information; Ret.: retrieval.

presents the 150 most frequent thematic descriptors assigned to the documents.

The analysis of the co-occurrence frequency of the descriptors has enabled the identification of 18 thematic research core fields. Three large thematic groups come forward in the center of the network (closely linked together and with a high relationship density)—one connected with the *World Wide Web*, another with *Education,* and a third with *Libraries*—in which different types of libraries can be distinguished, such as university libraries or public libraries. In the periphery of the network, a further 12 research cores can be seen, one of these being connected with libraries (*Library and Information Science*) and the others with the World Wide Web and Internet (*Networks*, *Computer Security*, *Information Technologies, Electronic Media, Electronic Publications, Bibliometrics, Electronic Commerce, Computer Applications, Medicine, Searches* and *Online Information Retrieval*). Other fields of research such as *Social Aspects of ICTs*, *Copyright,* and *Business Information* with a lower density of relationships were observed.

Table 2 shows the list of the research cores with the main descriptors with which these are linked and Figure 1 shows the network of relationships between descriptors.

Discussion

Studies to do with library practice continue to take a preeminent role in research, though with variations in the subjects tackled. Hence, in the 1960s, 70s, and 80s, the emphasis was placed on aspects such as the technical and automation process (Buttlar, 1991; Feehan, Gragg, Haverner, & Kester, 1987; Jarvelin & Vakkari, 1990; Jarvelin & Vakkari, 1993; Nour & Peritz, 1985) and greater importance later on being given to research connected with information storage and recovery through catalogues and library databases (Koufogiannakis & Crumley, 2006; Tsay, 2004). Other spheres such as library cooperation, the use of surveys, and user training stand out in the present study. Other matters connected with libraries, such as management and materials (collection), continue to play a prominent role.

As regards the preeminence of university libraries, one should bear in mind that the publishing pressure stemming from librarians working at academic institutions may be a variable explaining the over-representation of university libraries.

The main novelty regarding the preceding decades' research is the importance taken by the World Wide Web, which draws numerous spheres of research together—some major ones being computer applications, electronic media, electronic commerce, and information search and retrieval. This is quite understandable due to the major impact caused by the development of the Internet as a technological tool, which has caused a profound change in activities connected with information and documentation (D'Elia, Jörgensen, Woelfel, & Rodger, 2002; Tsay, 2004).

Other domains that continue to play a major role stimulating research in the area are medicine and the health care and research connected with scientific publications based on bibliometric approaches (such as the citation analysis or the

TABLE 2.   Main areas of research and the most prominent descriptors connected with each of these in papers indexed in the LISA database (2004–2005).

| Main areas | Main descriptors related | | | | | |
	Descriptor 1	Fr.C.	Descriptor 2	Fr.C.	Descriptor 3	Fr.C.
World Wide Web	Online information retrieval	268	Searching	132	Web sites	115
Education	Computer assited instruction	219	Educational technology	164	Distance learning	73
Libraries	Users	90	Education activities	67	User training	58
Academic libraries	Surveys	54	Cooperation	51	User training	50
Public libraries	Surveys	50	Users	38	Library management	34
University libraries	User training	91	Electronic media	68	Library materials	68
Library and Information Science	Professional Education	58	Curricula	31	Research	31
Networks	Mobile communications	219	Wireless comunications	219	Routing	86
Computer Security	Networks	60	Privacy	34	Authentication	30
Information Technologies	Communications technology	202	Access to information	63	Government information	53
Electronic Media	Library materials	126	Preservation	81	University libraries	68
Electronic publications	Scholarly publications	59	Open access	33	Articles	31
Bibliometrics	Periodicals	111	Articles	109	Science and Technology	46
Electronic commerce	Business	100	Computer applications	98	Online payment	94
Computer applications	Medicine	282	Health care	194	Expert systems	167
Medicine	Health care	379	Computer applications	282	Online information retrieval	89
Searches	Online information retrieval	309	World Wide Web	132	Computerized information storage and retrieval	83
Online information retrieval	Searching	309	World Wide Web	268	Web sites	126
Social aspects of ICTs	Information communication	37	Information technology	32	–	–
Copyright	Law	61	Electronic media	35	–	–
Business information	Information work	46	Companies	38	–	–

Note: Fr.C.: Frecuency of co-ocurrence.

FIG. 1. Co-Word Network in papers indexed in the LISA Database (2004–2005). 338 × 250 mm (96 × 96 DPI).

impact factor) or in relation with electronic publications (electronic journals and open access). The panorama is completed by another series of research cores, such as law in relation with copyright and data security and protection in access to information or the sources of information connected with business and companies.

The presence of some descriptors, such as *students* or *users* in the top positions of frequency ranking and at the center of the relations network constructed, reflects the change in course in a good deal of the research in respect of the investigation performed in preceding decades, as this has gone from a perspective focusing on organizations' internal aspects, their problems, and their role of intermediaries to one that values the role played by users as final consumers of information and the services offered (Jarvelin & Vakkari, 1990; Jarvelin & Vakkari, 1993; Kumpulainen, 1991).

The study performed leads to the conclusion that, although a good deal of the research in the sphere of Library and Information Science continues to be of practical and applied nature in relation with the sphere of libraries, the development of the World Wide Web and information and communication technologies has brought studies connected with these spheres

into the heart of research activity. The importance assumed by the final user—as hub of all the processes and services offered by organizations and through the World Wide Web and computer applications—is also a prominent aspect.

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References

Batagelj, V., & Mrvar, A. (2001). Pajek (Version 0.70)—Program for large network analysis. Slovenia: University of Ljubljana.

Burke, C. (2007). History of information science. Annual Review of Information Science and Technology, 41, 3–53.

Buttlar, L. (1991). Analyzing the library periodical literature: content and authorship. College and Research Libraries, 52, 38–53.

Delgado López–Cózar, E. (2002). La investigación en Biblioteconomía y Documentación (The research in Library and Information Science). Gijón: Trea.

D'Elia, G., Jörgensen, C., Woelfel, J., & Rodger, E.J. (2002). The impact of the Internet on public library use: An analysis of the current consumer

market for library and Internet services. Journal of the American Society for Information Science and Technology, 53, 802–820.

Feehan, P.E., Gragg, W.L., Haverner, W.M., & Kester, D.D. (1987). Library and Information Science research: An analysis of the 1984 literature. Library and Information Science Research, 9, 173–85.

Jarvelin, K., & Vakkari, P. (1990). Content analysis or research articles in Library and Information Science. Library and Information Science Research, 12, 395–421.

Jarvelin, K., & Vakkari, P. (1993). The evolution of Library and Information Science 1965–1985: A content analysis of journal articles. Information Processing and Management, 29, 129–44.

Koufogiannakis, D., & Crumley, E. (2006). Research in librarianship: Issues to consider. Library Hi Tech, 24, 324–40.

Kumpulainen, S. (1991). Library and Information Science research in 1975: Aontent analysis of the journal articles. Libri, 41, 59–76.

Library and Information Science Abstracts. (2006). Bethesda, MD: Cambridge Scientific Abstracts.

Norman, S. (1988). The Library Quarterly in the 1930s: A journal of discussion's early years. Library Quarterly, 58, 327–351.

Nour, M.M., & Peritz, B.C. (1985). A quantitative analysis of the research articles published in core library journals of 1980. Library and Information Science Research, 7, 261–73.

Rayward, W.B. (1997). The origins of Information Science and the Internacional Institute of Bibliography/International Federation for Information and Documentation (FID). Journal of the American Society for Information Science, 48, 289–300.

Tsay, M.Y. (2004). Literature growth, journal characteristics, and author productivity in subject indexing, 1977 to 2000. Journal of the American Society for Information Science and Technology, 55, 64–73.