

LIS and other knowledge domains: interdisciplinarity of LIS scholars' publications (pilot study)

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Abstract

This pilot study focuses on a balance between importing and exporting qualities of LIS. The collected data leads to the conclusion that importing qualities of LIS are still prevailing though rapid change in information technologies attracted attention of scholars and practitioners from many disciplines to LIS. The fact that almost the same disciplines are among those citing LIS more frequently as well as among those LIS authors refer to, leads to the conclusion that there are some meaningful connections between LIS and those disciplines. The limited scope of the study prevents one from broader extrapolations. A study on a greater scale, with more sophisticated techniques of identifying disciplines of publications can lead to more accurate conclusions about the architecture and nature of LIS disciplinary connections.

1. Introduction: LIS and interdisciplinarity

1.1 Interdisciplinarity

Interdisciplinarity is one of the most visible trends at all levels of academic life: research, publishing, teaching, and administration. The term itself exists since mid-20th century but the phenomenon, which it signifies, has a long history (Klein, 2005, 15). As Abbott notes, "like most good ideas in social sciences, interdisciplinarity is old news" (Abbott, 2001, 131). After a long period of disciplinary differentiation and specialization, interdisciplinarity was re-opened in 1960-70s (Latucca, 2001).

There is more than one definition of interdisciplinarity. The term means slightly different things for different authors. Bailis observes that it "...refers to

numerous practices" (Bailis, 1990, 1). Klein emphasizes the plurality of interdisciplinary practices as well, "Given the diversity of interdisciplinary activities, there are considerable differences of opinion about their nature and epistemological status" (Klein, 1990, 37). Nevertheless, most of those writing on the topic agree that interdisciplinarity implies some overlap between disciplines and "represents an integration of material from various fields of knowledge into a new, coherent entity" (Smith, 1992, 261). The degree of the overlap and integration can vary. Berger claims that the "interaction may range from simple communication of ideas to the mutual integration of organizing concepts, methodology, procedures, epistemology, terminology, data, and organization of research and education in a fairly large field" (Berger, 1972, 25). Nicolescu names "three degrees of interdisciplinarity: (a) degree of application [...]; (b) epistemological degree [...]; (c) degree of the generation of new disciplines" (Nicolescu, 2002, 43).

Though interdisciplinarity seems to be considered by some researchers, practitioners, and educators a threat to disciplines' integrity, it does not rule out disciplines. Moreover, interdisciplinarity seems to be an integral part of the process of "disciplinization". Disciplines provide "a context for research, the intellectual background which helps to determine what research methods are used and how research problems are identified" (Webber, 2003, 315). Many of the modern research problems are simply too complex to be solved by efforts of one discipline. Such problems foster interdisciplinarity because "interdisciplinarity is inherent in the nature of reality" (Roy, 1979, 195). As Szostak points out, researchers involved in interdisciplinary studies "do not, in fact, integrate across disciplines *per se*, but across phenomena, theories, methods, and perspectives" (Szostak, 2002, 119). Because of this, "the more differentiation of knowledge production the more intense will be the call for interdisciplinarity" (Weingart, 2000, 30).

Cronin and Pearson call the flow of ideas between the knowledge domains a natural process. "Ideas flow across disciplinary frontiers, bypassing customs and immigration authorities...while the growing band of interdisciplinary scholars and research programmes ensures that *de facto* forwarding agents are in place to expedite the inflow of novel consumer goods (ideas) and services (techniques, processes)" (Cronin & Pearson, 1990, 385-386). LIS as a field of study seems to be actively involved in this process.

1.2 LIS and interdisciplinarity

Interdisciplinarity is important for LIS scholars, practitioners, and educators for two main reasons. First, LIS is one of those fields of study that claim to be intrinsically interdisciplinary. Hence, understanding interdisciplinarity means understanding LIS' disciplinary identity, which is, nowadays, quite elusive. Not long ago one could witness a wave of debate about LIS education and the disciplinary foundations of LIS as a discipline (Dillon & Norris, 2005; Estabrook, 2005; Malone et al., 2005). Yet, according to Borgman, disciplinary 'self-awareness' is important to every field of study because it "marks any maturing field" (Borgman, 1990, 12).

Second, LIS' ultimate goal is to provide access to knowledge. In order to succeed in that direction, LIS professionals have to understand clearly the structure of modern knowledge and the processes underlying the "tectonic processes" behind its construction and reconstruction.

In 1990, Cronin and Pearson came up with the "economic analogy... to explore the contributions made by information scientists to other disciplines" (Cronin & Pearson, 1990, 381). They stated that the "export : import" ratio is extremely important for evaluating a discipline because it defines "disciplinary robustness" (Cronin & Pearson, 1990, 381). As Hall notes, "In multidisciplinary fields, such as information science, engagement with theory originally derived elsewhere, and the importing of tools from different domains, is important... To an extent, it might be argued that "borrowed" theory is a tradition of information science" (Hall, 2003, 288).

According to Cronin and Pearson, LIS as a discipline imports more than exports (Cronin & Pearson, 1990). LIS seems to borrow heavily from other disciplines. Yet, at the same time, ALA accredited schools' faculty actively publish in other disciplines' scholarly periodicals; and a wide variety of knowledge domains express a significant interest to LIS research citing LIS scholars' publications (Pluzhenskaia, 2007).

LIS is a compound discipline, combining wisdom and tradition of librarianship with the youth's vigor and energy of information science. It is a very dynamic field. Its subjects and objects are changing along with information technologies. The years since Cronin and Pearson study of exporting/importing qualities of LIS brought many changes in the discipline's research agenda. The ubiquitous notion of information seems to bridge LIS with many disci-

plines. So the discussion on what LIS borrows from other fields of study and what it offers in return is an ongoing one. In order to assure healthy "personal growth" of the disciplines, it is vitally important to understand the nature and extent of those epistemic bridges.

1.3 The pilot study of the "reference-citation" ratio in LIS publications

The manner in which one discipline ventures into the intellectual territory of another discipline can be very complex and hard to comprehend. "[D]ifferent disciplines may use different terminology to describe the same phenomenon, process, or even theory" (Szostak, 2002, 107). Interdisciplinarity cannot be simply presented as a Venn diagram. It is not just an overlap of disciplines including all their aspects (social, cognitive, administrative etc.). It is much more complex. Palmer states that there is more than one way for disciplines to integrate, that "there are many ways that people and information move across boundaries and interact effectively during the course of complex and integrative scientific work" (Palmer, 2001, ix). Incorporating research findings, methodologies, and even theoretical frameworks from other disciplines, trying to identify which ones are relevant to the modern LIS research agenda, is one way of making interdisciplinary connections.

Capurro and Hjørland emphasize the key position of information both for library science and information science and its role in making and maintaining interdisciplinary connections, "As we have seen, the word *information* has a much richer history than the fields of inquiry known as library science, documentation, and information science... Tracing the influence of this term and the very complex net of disciplines connected with it is indeed difficult" (Capurro & Hjørland, 2003, 378-379). This net can be studied in several ways (Cronin & Pearson, 1990; Paisley, 1990).

Since "[p]ublications are not the only, but certainly one of the most important elements in ... knowledge exchange process" (Van Raan, 2000, 305), the connections between disciplines can be identified based on the field's scholars' publishing and citing patterns, i.e., by (1) number of works from other disciplines cited by LIS scholars and practitioners ("import") and (2) number of citations from other disciplines to LIS publications ("export").

This paper presents the findings of a pilot study of the ratio between references LIS scholars and practitioners make to publications in other disciplines and citations they receive from other fields. Its

goal is twofold. First, it is an attempt to identify the significant disciplinary connections of LIS. Second, its task is to decide whether or not a method of counting and comparing references and citations within one LIS journal for a number of years is worth trying on a larger scale.

2. Methodology

2.1 Citation analysis.

Citation analysis proved to be the most appropriate method for tracing relationships between disciplines and connections within them (Garfield, 1955a; Garfield, 1955b; Garfield, 1963; Small & Garfield, 1985; McCain, 1990,1991; Smith, 1981). As Chen writes, "Citations analysis takes into account one of the most crucial indicators of scholarship: citations..."(Chen, 2003, 144). The method has its limitations. Things like negative citations, self-citations, different citation cultures can lead to false conclusions. Though, these limitations are less significant in the study of interdisciplinary connections because any citation to a publication from another field signals about its author's awareness of that field's existence and the opportunities it provides for scholars from other knowledge domains.

2.2 The data source.

2.2.1 The source of references.

Articles in the *Library & Information Science Research* (LISR) for 1994-2004 were analyzed. This journal was chosen for this pilot study for two reasons. First, it covers both library science and information science research. Second, it is one of LIS publication which strives to keep a balance between practice- and theory-oriented articles thus representing a wide array of LIS methodologies and research themes. As the journal's editors state, "Much of the research in library and information science is practical or descriptive" (Hernon, P. & Schwartz, C., 1994, 1). They also state that "Studies in information science are more likely than those in library science to focus on pure, theoretical, or scientific research ... and to advance, test, and refine hypotheses and theories" (Hernon, P. & Schwartz, C., 1994, 2). In 1994, defining the journal's goals, Hernon and Schwartz wrote that the journal "will include in its coverage applied, action, decision, evaluation, and methodological research but not to the exclusion of basic research" and "include papers on new topics, ones that better position library and information sci-

ence within a larger perspective" (Hernon, P. & Schwartz, C., 1994, 2). Debora Shaw observed "that LISR covers a broad mix of topics and a good range of research methods..." (Schwartz, C., 2003, 233). The latter is especially important when connections with other knowledge domains are considered.

2.2.2 The source of citations.

The Web of Knowledge was chosen as the source of citations because it allows search across disciplines.

2.3 Time line.

The articles published in 1994-2004 were studied. The time line was cut off at 2004 because more recent publications did not have time to collect as many citations as those published earlier. Since citations are one of the key variables in this study, it is important to make sure that the publications in question had enough time to accumulate them. It is even more important when citations from other fields are being studied because scholars and practitioners are usually less familiar with publications in "foreign" fields unless they had prior connections with them. It thus might take them longer to spot a publication in a periodical from another discipline, relevant to their research or practice.

2.4 The procedure.

All the articles in the LISR (1994-2004) were studied. All the references and citations were collected, counted, and stored in an Excel database. The disciplines of the references and citations were identified. For articles, titles of the periodicals were the primary source of such identification. For books, a title of a publication was the primary source for identifying the publication's discipline. When the title was ambiguous, it was looked up in the *WorldCat*, for example, "Theories of the middle range" by H. Poole (Information Science), "Structural holes" by R. Burt (Sociology), and "Adoption of new ideas and practices" by H. Lionberger (Agriculture). The only exclusion from this rule were the titles of periodicals too general or/and interdisciplinary like "Science" and "New York Times", or "Reader's digest". In those cases, the title of the article was used for identifying the discipline.

2.5 Limitations

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There are several limitations which should be mentioned. First of all, it is a pilot study. The scope is limited to one journal title, and the time line is limited to 11 years. The Web of Knowledge, though multidisciplinary and reliable, is not a comprehensive source of citations.

Except this, assigning disciplines to publications-sources of references and citations was somewhat arbitrary. Many books and articles are excellent examples of the growing interdisciplinarity, which makes the procedure of assigning disciplines to them extremely difficult. Every care has been taken to make sure that the most appropriate discipline has been assigned to every publication. In order to increase the level of objectivity of the process, a triple disciplinary identification has been performed. Some of the titles were identified as interdisciplinary. Since such "disciplinary affiliation" could make the analysis meaningless, the appropriate disciplines have been assigned whenever possible.

3. Findings and discussion

6,815 references and 1,357 citations were collected and analyzed. The numbers for the years 1994-2004 are presented in Table 1.

Table 1. Number of references in LISR's articles and citations to them (1994-2004)

Year	Number of citations to LISR's articles			Number of references in LISR's articles		
	From LIS	From other disciplines	Total number	To LIS	To other disciplines	Total number
1994	110	3	113	169	192	361
1995	189	19	208	216	173	389
1996	80	9	89	267	247	514
1997	108	28	136	354	249	603
1998	120	8	128	137	173	310
1999	135	8	143	588	321	909
2000	71	20	91	293	239	532
2001	147	19	166	319	305	624
2002	91	11	102	334	238	572
2003	78	13	91	473	562	1035
2004	76	14	90	576	390	966

It is clear that while the ratio "LIS-Other Disciplines" for references is close to 6 : 5, it is only 8 : 1 for the citations. LISR's authors seem to draw on other disciplines' publications almost as often as on the ones from LIS. This data confirms the 18-year old

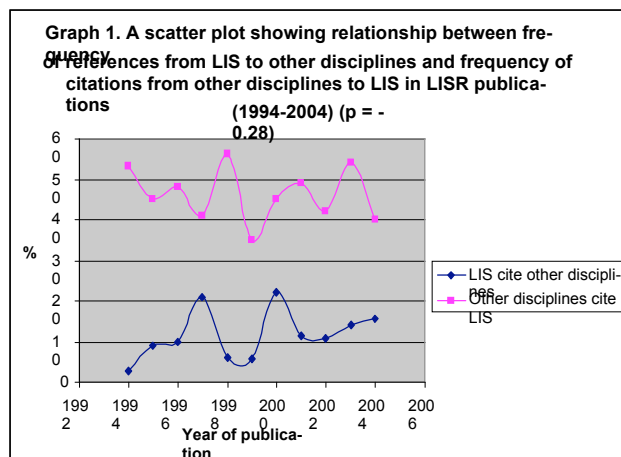
conclusions of Cronin and Pearce about exporting and importing qualities of LIS.

The percentages of citations to LISR's articles from disciplines other than LIS and references in LISR's articles to disciplines other than LIS are presented in Table 2.

Table 2. Percentages of citations to and references in LISR's articles (1994-2004)

Year	% of citations to LISR's articles from disciplines other than LIS	% of references in LISR's articles to disciplines other than LIS
1994	3	53
1995	9	45
1996	10	48
1997	21	41
1998	6	56
1999	56	35
2000	22	45
2001	11	49
2002	11	42
2003	14	54
2004	16	40

The difference between the numbers in the two columns is quite noticeable. The following graph presents a scatter plot showing the relationship between frequency of references from LIS to other disciplines and those of citations to from other disciplines to LISR's publications:



LIS scholars cite a wide variety of knowledge domains and receive citations from many of them (Appendices 1 and 2). The number of disciplines LISR's articles refer to is noticeably greater than the number of citations from other disciplines they receive (43 and 14 respectively). Table 1 shows those disciplines to which LIS scholars refer to most often.

Table 3. Disciplines, which LISR's authors cite most often:

Discipline	Number of references to the discipline	% of total number of references to disciplines other than LIS
Sociology	672	22 %
Education	376	12 %
Psychology	313	10 %
Medicine, Health Studies	162	5.2 %
Computer Science	152	4.9 %
Business administration and Management	149	4.8 %
Interdisciplinary	145	4.6 %
Government	119	3.9 %
Business, Finance, Marketing	117	3.8 %
Communication	116	3.8 %

The following table presents disciplines, which cite LISR's more often than others.

Table 4. Disciplines, which cite LISR's authors most often:

Discipline	Number of citations from the discipline	% of total number of citations from disciplines other than LIS
Education	43	28 %
Psychology	37	24 %
Medicine, Health Studies	18	12 %
Computer Science	15	9.9 %
Business, Finance, Marketing	10	6.6 %

Interdisciplinary	8	5.2 %
Communication	7	4.6 %
Sociology	3	2 %

The data shows strong connections between LIS and, first of all, social sciences (Sociology, Education, Psychology). That was quite predictable since LIS shares methodology with the rest of the social sciences. The visibility of connections with Computer Science seems to be logical and predictable, as well, since the expressions "information technology" and "computer technology" are practically synonyms. Noticeable mutual sympathy between LIS and Medicine and Health Studies is less obvious though not surprising because of a recent rapid development of medical informatics.

The fact that almost the same disciplines/fields of studies cite LIS publications and are cited by LIS scholars might be of interest. It can mean that the interest between LIS and those disciplines is mutual and signify some meaningful connections between LIS and those disciplines (Sociology, Education, Psychology, Medicine and Health Studies, Computer Science, Communication).

The question is whether or not there is a correlation between ratio references to LIS and to other disciplines and ratio between citations from LIS and from other disciplines. i.e. an import-export ratio.

Multiple references to and citations from Business and Administration and Management might be explained by growing of use of management information systems. The content analysis of the LISR's articles cited by non-LIS authors and combinations of comparing citation patterns for journals representing different spheres of LIS might be the next logical step to obtain data of fine granularity and greater volume.

5. Conclusions

The data collected in the study leads to the conclusion that, first, importing qualities of LIS are still prevailing though rapid change in information technologies attracted attention of scholars and practitioners from many disciplines to LIS. The number of disciplines expressing interest to LIS publication is significantly less than the numbers of those LIS authors cite in their works. The fact that almost the same disciplines are among those citing LIS more frequently as well as among those LIS authors refer to, leads to the possible conclusion that there are

some meaningful connections between LIS and that disciplines. More close study of those connections might shed some light on the structure LIS as a discipline and provide some insights on its future.

This study is limited to one LIS journal. Though the *Library & Information Science Research* represents many facets of the LIS complex research agenda, it cannot account for the whole field of study, especially as complex and rapidly evolving as LIS. So, it should be noted that the limited scope of the study (pilot) prevents one from broader extrapolations.

As Prentice pointed out, "The map of knowledge with its various disciplinary boundaries is not static" (Prentice, 1990, xiv). The future might change significantly the nature and number of LIS' disciplinary connections because information is taking central stage in society and "more and more resources and expenditures are channeled into various information-related activities" (Saracevic, 1999, 1054). A study on a greater scale, with more sophisticated techniques of identifying disciplines can lead to more accurate conclusions about the architecture and nature of LIS disciplinary connections. It would help to predict the further evolution of the field, and, thus, strengthen its research, praxis, and education.

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APPENDIX

Appendix 1. Disciplines and fields of study LISR's articles refer to:

Agriculture
Anthropology
Area Studies
Arts
Biology
Business
Business Administration and Management
Communication
Computer Science
Economics
Education
Engineering
English language
Environmental Studies
Ethnography
Geography
Government Publications, Government Studies
History
Humanities
Journalism
Law
Linguistics
Literature
Marketing
Medicine and Health Studies
Media Studies
Museum Studies
Organizational Behavior
Organizational Science
Philosophy
Physics
Political Science
Psychology
Public administration
Publishing
Religious Studies
Sociology
Social Work
Sports
Statistics
Urban Studies
Veterinary

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Women Studies

Appendix 2. Disciplines and fields of study LISR's
articles receive citations from:

Area studies
Biology
Business
Business Administration and Management
Communication
Computer Science
Economics
Education
Linguistics
Medicine and Health Studies
Psychology
Public Administration
Sociology
Urban Studies