Cronin, B., & Meho, L. I. (2008). The shifting balance of intellectual trade in information studies. *Journal of the American Society for Information Science and Technology, 59*(4), 551–564.

The Shifting Balance of Intellectual Trade in Information Studies

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ABSTRACT

The authors describe a large-scale, longitudinal citation analysis of intellectual trading between information studies and cognate disciplines. The results of their investigation reveal the extent to which information studies draws on and, in turn, contributes to the ideational substrates of other academic domains. Their data show that the field has become a more successful exporter of ideas as well as less introverted than was previously the case. In the last decade, information studies has begun to contribute significantly to the literatures of such disciplines as computer science and engineering on the one hand and business and management on the other, while also drawing more heavily on those same literatures.

INTRODUCTION

Citation analysis is a powerful means of mapping the flow of ideas between specialty groups, disciplines and nation states (e.g., Liu & Wang, 2005; Peritz & Bar-Ilan, 2002; Urata, 1990). The matrices and maps produced by bibliometricians and others can be used to demonstrate the relative impact and perceived utility of research, all the way from a single paper on topic X to the entire published output of a nation state in a discipline, in both domestic (intra-disciplinary) and foreign (extra-disciplinary) markets. Here we describe a large-scale citation analysis of intellectual trading between information studies and other disciplines. The results of our study reveal the extent to which information studies draws on and in turn contributes to the ideational bases of other academic domains. For an overview of the theory and application of citation analysis, the reader is referred to Garfield (1979).

AN ECONOMIC METAPHOR

In their study, "The export of ideas from information science," Cronin and Pearson (1990, p. 381) analyzed citations to the publications of a number of grandees within the field and found that the impact of these scholars' work outside their home discipline was rather modest; they spoke of an "apparently weak export performance" (p. 386). Researchers in other disciplines have since employed the same economic metaphor. Lockett and McWilliams (2005, p. 139) used citation analysis to determine "whether management exports knowledge to a broader academic community." They found evidence of "a substantial trade deficit" (p. 148). Goldstone and Leydesdorff's (2006, p. 988) paper, "The import and export of *Cognitive Science*," established that the interdisciplinary journal in question had "a strong export of ideas to other fields." Arhonditsis, Adams-VanHarn, Nielsen, Stow and Reckhow (2006, p. 6553) used citation analysis to estimate the broad impact of work in the field of mechanistic aquatic biogeochemical modeling. They found that some research in oceanic modeling had the "ability to produce exportable knowledge" (p. 6553). Stegmann and Grohmann (2001, p. 493) analyzed publication and citation data for dermatology and found that "each journal exhibits a characteristic profile with respect to … its knowledge export." Grover et al. (2006, p. 290) note that information systems "has always been viewed as an importer of ideas," though they found that the knowledge base of the field was being drawn on more extensively than before by its "traditional reference disciplines" (p. 293).

Crudely stated, a discipline that is a net exporter of ideas to others can be said to have a healthy balance of trade; a discipline that is a heavy importer of ideas can be characterized as having a weak balance of trade. A strong discipline *may* be one that has a positive trade balance, but that need not necessarily be the case. Conversely, a discipline with a poor export record is

not thereby a failing field. Nevertheless, it is not unreasonable to posit that a discipline which is being ignored (i.e., receives few if any citations from other disciplines) may be suffering from "intellectual inbreeding" (Bedeian, 2005, p. 154), may be stagnating, or may lack a strong "cumulative tradition" (Keen, 1980, p. 9). By the same token, a discipline may be so technically sophisticated and theoretically fecund that it is neither a significant importer nor exporter of ideas: it is happily self-contained.

Over the years, social scientific disciplines such as psychology and sociology have successfully exported theories and methods to epistemic near neighbors (e.g., management, political science). Other disciplines are more self-reliant; economics, for example, "is oriented toward itself" (Bedeian, 2005, p. 154). Harnad (2007) talks metaphorically of disciplines being endogamous or exogamous based on their citation characteristics; economics is clearly endogamous, highly self-citing in other words. As Ferraro et al. (2005, pp. 10-11) note: "Economics enjoys status and, indeed, dominance … Economics literature is cited more frequently in other social sciences literature." Management, by way of contrast, is "an integrating discipline" (Bedeian, 2005, p. 154), much less self-contained than economics. Such characterizations call to mind Mote's (1962) distinction between high-scatter and low-scatter domains. In the case of the former, scholars typically have to search widely across fields and disciplines to source relevant materials (see also Bates, 1996 and Talja, 2005 on topic dispersion).

It is not illogical to suggest that a healthy discipline will produce, consciously or otherwise, intellectual goods for consumption in both domestic and foreign (export) markets. This would seem to be the view of Menand (2005, p. 14), who has argued that humanities departments should "colonize … hunt down the disciplines whose subject matter they covet and

bring them into their own realm." As Cronin and Pearson (1990, p. 382) put it: "The more attractive the goods (new insights, paradigms, models, techniques, patents, interpretations) on offer, the wider the potential market." And yet, as Bowker (2005, p. 123) observes, "scientists are not trained to share information across disciplinary divides," a view borne out by Kärki's (1996, p. 333) co-citation analysis of research into scholarly communication in both sociology of science and information science: "members of a community do not attend to the work of non-members and insights originating in a discipline may be lost to those outside its circles." Her findings apply more widely, as Swanson has demonstrated in his continuing analysis of logically linked but non-interacting literature corpora (e.g., Swanson, 1986).

Inherent disciplinary differences and also differences in institutional regimes and material practices clearly have a bearing on knowledge import and export ratios. To take an extreme case, there is little likelihood of intellectual trading between information studies (information science, librarianship, information management, archival studies, etc.) and nuclear physics, given the manifestly high degree of disciplinary separation (in terms of paradigms, content, methods, and contexts). However, there are good prima facie reasons to assume that some research in information studies should be of interest to scholars in, for instance, education or communication studies. These disciplines have a measure of topical overlap (e.g., knowledge management, information transfer, formal and informal modes of communication) and one might thus expect there to be some multilateral exchange of concepts and methods (e.g., Borgman & Rice, 1992; Rice, Borgman, & Reeves, 1988). Likewise, one might expect there to be "interdisciplinary citation traffic" (Tang, 2004, p. 58) between computer science and information studies, particularly in the field of information retrieval. But experience suggests that common subject

interests do not always or necessarily translate into the expected density of inter-disciplinary citation.

Miyamoto, Midorikawa and Nakayama (1990, p. 80) found that library and information science took "89% of its journal citations from itself" and opined that it might "lapse into irrelevancy." In their analysis of the sub-field of human information behavior (HIB)—an area, it would appear, of growing significance within information studies—McKechnie, Goodall, Lajoie-Paquette and Julien (2005) found that HIB research was consumed primarily by other human information behavior researchers: 85% of all citations to the literature came from insiders. They concluded that human information behavior was "yet to have theoretical and methodological impact on other disciplines." A co-citation analysis by Ellis, Allen and Wilson (1999) found little evidence of intellectual interaction between the ostensibly cognate domains of information science and information systems. White (2004) reexamined the connection between two sub-fields of information science and linguistics (citation analysis and discourse analysis, respectively) and found that although the strength of interdisciplinary ties between the two domains remains fairly weak, citationists have been making greater use of research in linguistics of late.

The findings of these various studies lend some credence to Cronin and Pearson's (1990, p. 386) speculation that information science is a weak export performer. As Grover et al. (2006, p. 272) note with regard to information systems, such matters "demand a level of introspection that goes beyond speculation or pontification." The same surely holds for information studies. The purpose of this study, then, is to provide a robust test of Cronin and Pearson's claim using scaled-up data sets covering the somewhat broader literature of information studies.

METHODS

Citation analyses of knowledge exchange involving information studies (IS) and other disciplines have tended to: a) cover a fairly limited time period (e.g., Peritz & Bar-Ilan, 2002—articles published in *Scientometrics* in 1990 and 2000; Tang, 2004—IS articles published in 1975, 1980, 1985, 1990, 1995, and 2000); b) concentrate on a specific sub-field of IS (e.g., Ellis, Allen, & Wilson, 1999—user studies and information retrieval; Kärki, 1996—scholarly communication; McKechnie, Goodall, Lajoie-Paquette, & Julien, 2005—human information behavior; Tang, 2004—information retrieval; White, 2004—citation analysis); or c) examine a small number of works (e.g., Buttlar, 1999—61 library science and information science dissertations; Meyer, 1996—24 library science journals; Tang, 2004—150 IS articles; White, 2004—cocitation counts of six prolific authors). The present study extends considerably both the scale and scope of such investigations.

We conducted a large-scale, longitudinal citation analysis of exports from, and imports to, the literature of IS based on an inclusive population of journals and conference proceedings in the field. We gathered data covering a 30-year period (1977-2006) that we analyzed both cumulatively and by period (1977-1986, 1987-1996, and 1997-2006) in order to explore import/ export trends longitudinally.

To identify *exports from IS*, we retrieved all items in all three ISI (Institute for Scientific Information) databases that had cited any of the 275 IS journals and conference proceedings (periodicals, hereafter) that constituted our population (see Table 1).[1] We initially analyzed 577 unique periodical titles for possible inclusion; these were compiled from Nisonger and Davis (2005), *Ulrich's Periodicals Directory* (limited to "Refereed" and/or "Academic/Scholarly"

[1]The three ISI citation databases are: *Arts & Humanities Citation Index* (*A&HCI*), *Science Citation Index* (*SCI*), and *Social Sciences Citation Index* (*SSCI*).

periodicals with the subject "Library and Information Sciences"), Wilson's *Library Literature and Information Science* directory of indexed periodicals, and *WorldCat* (examining the top 500 periodicals that were assigned the subject headings of archives, information science, libraries, or library science).

We eliminated 302 titles because they were either not cited or were cited fewer than 30 times over the course of 30 years (1977-2006) or because they were titles that belonged to other/multiple disciplines. Examples of the latter include communication journals (e.g., *Journal of Health Communication*), management/information systems journals (e.g., *Information Systems Journal*, *Information Systems Research*, *Journal of Information Technology*, *Journal of Management Information Systems*, *MIS Quarterly*), and multidisciplinary humanities journals (e.g., *British Library Journal*, *The Library: Transactions of the Bibliographic Society*, *Studies in Bibliography*). We also excluded titles which had been in existence for fewer than six years (e.g., *International Journal of Information Ethics* [2004], *Journal of Map & Geography Libraries* [2004], and *Journal of Electronic Resources in Medical Libraries* [2004]); these were typically not cited or else cited very few times. Finally, we eliminated a few titles that might at one time have been classified as IS but had changed focus significantly over the years (e.g., *Journal of Chemical Information and Modeling* which was formerly known as *Journal of Chemical Information and Computer Sciences* and before that *Journal of Chemical Documentation*). We acknowledge that others might wish to either expand or constrain the criteria for inclusion.

Once we created our set of 275 IS periodicals, we used the ISI databases (through DIALOG) to identify all the items that had cited these periodicals.[2] In order to do this for each of the periodicals, we first had to identify all possible abbreviated title name strings in the cited

[2]The coverage period of the databases through DIALOG is 1980 to present for *A&HCI*, 1974 to present for *SCI*, and 1972 to present for *SSCI*.

references field in the ISI databases. For example, we found and used (among others) the following combinations/permutations in our searches in order to identify documents that had cited the journal *Library Quarterly*: LIB Q OR LIB Q JAN OR LIB Q JUL OR LIB Q OCT OR LIB QUART OR LIBR Q OR LIBR QUART? OR LIBRARY Q OR LIBRARY Q APR OR LIBRARY Q JAN OR LIBRARY Q JUL OR LIBRARY Q OCT OR LIBRARY QUART?

The 275 information studies periodicals were cited by a total of 67,693 items, of which 63,741 (94%) were published between 1977 and 2006.[3] We then restricted our focus to articles, conference papers, and review articles. By eliminating citations from other document types (e.g., book reviews, editorials, letters, and meeting abstracts), the number of citations we processed was reduced by 15% (9,560) to 54,181—distributed across approximately 4,000 periodicals.[4]

To identify *imports to IS*, we analyzed the references in all 48,441 "articles" and "review articles" found in the 80 IS periodicals that were covered in the ISI databases between 1977 and 2006 (see Table 2). With only a few exceptions (e.g., *The American Archivist*, *Behavioral & Social Sciences Librarian*, *IFLA Journal*, *Journal of Government Information*, and *Journal of Information Ethics*) the great majority of these periodicals have been covered continuously in the databases throughout the entire survey period (1977-2006) and/or for as long as they were in publication (e.g., *Drexel Library Quarterly* and *Wilson Library Bulletin* ceased publication in 1986 and 1995, respectively). In short, we found that the 48,441 "articles" and "review articles" cited tens of thousands of unique sources for a total of 566,000.

Because these sources were cited and entered into the ISI databases using abbreviated formats, we had to manually identify all the variant abbreviations used for a source and change

[3]All percentages reported here have been rounded to the nearest whole number.

[4]The actual number of periodicals in which citations to the IS literature were found was 5,490. Using *Ulrich's Periodicals Directory*, we found that 33% of the top-300 citing periodicals had changed names once or more since their creation, hence the rough estimate of 4,000.

these to the full and most recent name of the source (e.g., "AM DOCUMENTATION," "IN PRESS JASIS," "J AM SOC INFORMATION," "J ASIS," "J DOCUMENTARY REPROD," and "JASIST" to *Journal of the American Society for Information Science and Technology*).[5] In some instances, the same source was cited and entered into the ISI databases in more than 50 different ways (e.g., *Proceedings of the American Society for Information Science and Technology*). Because it was impracticable to standardize the names of all cited sources, we limited ourselves to those 7,000 unique sources that had each been cited at least five times in the 48,441 articles that we examined. As in the case of identifying abbreviations for the 275 IS periodicals used for examining exports, the process of standardizing the names of sources cited by IS periodicals took several hundred hours.

Once we stabilized the names of the 7,000 unique cited sources, we used ISI's journal subject classification scheme, citation analysis (see below), and our domain knowledge to assign each source the discipline to which it belonged. If the cited source was a journal that was assigned only one subject category by ISI, it was classified accordingly (e.g., *Library Quarterly* was classified under "Information Science & Library Science" exclusively and was, therefore, treated as an IS journal).[6] If the cited source was a journal that was assigned more than one subject category by ISI, we classified it based on the subject background of the journals that had

[5]As can be seen from this example, we collapsed the older names of a journal (*American Documentation*, *Journal of Documentary Reproduction*, and *Journal of the American Society for Information Science*) under their most recent name (*Journal of the American Society for Information Science and Technology*).

[6]We made a few exceptions to this rule. When we disagreed with ISI's subject classification of a journal, we used our domain knowledge and citation analysis to decide on the most accurate subject classification for that journal. For example, *Journal of the American Medical Informatics Association* is classified by ISI under "Information Science & Library Science" exclusively. Both our knowledge of the journal and citation analysis indicates that the journal actually belongs to, and is most frequently cited by, informatics journals. So, this journal was classified by us as informatics rather than IS.

cited it most frequently. For example, *MIS Quarterly* was classified as both "Information Science & Library Science" and "Management." An analysis of the titles that have cited *MIS Quarterly* revealed that it has been cited mostly by business and management journals, followed by computer science. In this case, the journal would be classified as a business and management journal. We applied the same approach for a variety of sources not listed in the ISI databases, such as books. For example, *Introduction to Modern Information Retrieval* by Salton and McGill (1983) was cited between 1977 and 2006 mostly by computer science and engineering journals and was, therefore, assigned to computer science and engineering. Since it was effectively impossible to assign subject categories to all of the 7,000 cited sources, we limited ourselves to the 200 most cited. These 200 sources accounted for 139,459 or 25% of the 566,000 cited references found in the 48,441 IS articles examined here.[7]

RESULTS AND DISCUSSION

Exports

Of the 54,181 papers that cited the 275 IS periodicals included in the study, 28,363 (52%) came from outside the field. Exports from IS to other fields have increased significantly over time. As shown in Figure 1, and in greater detail in Table 3, the number of non-IS papers citing the IS literature has risen from 3,982 for the period 1977-1986 to 18,079 for the period 1997-2006, an increase of 354%. By way of contrast, the level of intra-field citations (IS citing IS) increased by a mere 33% during the same time period.

[7]The top-100 cited journals accounted for 115,102 (20%) of the 566,000 cited references found in the 48,441 IS articles we examined. The top-300 cited journals accounted for 153,000 (27%).

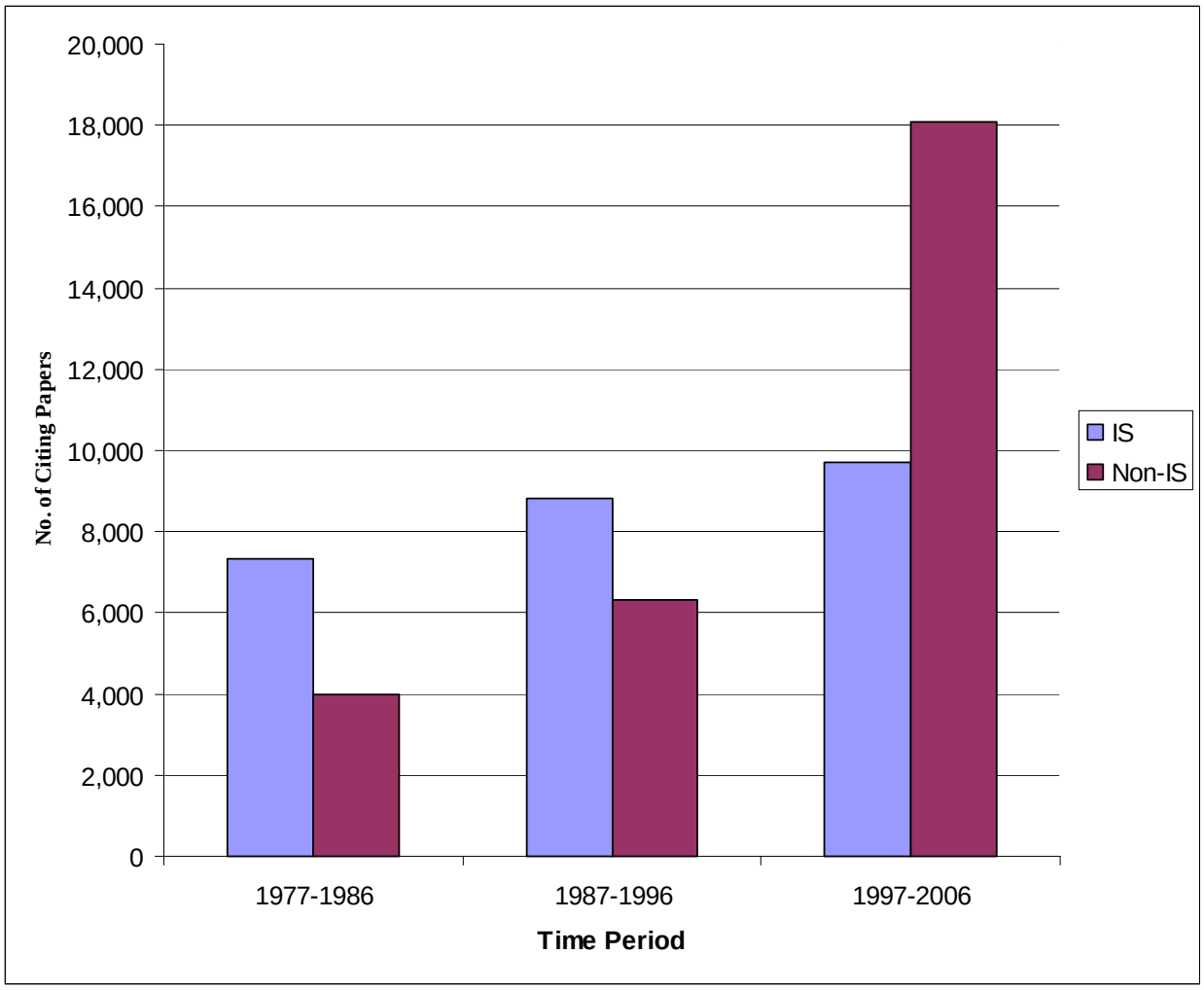

Figure 1. Papers citing the information studies literature

We believe that the striking increase in foreign citations to the literature of IS can be explained in large measure by two developments. First, the growth of research domains influenced materially by advances in information technology and Internet applications (e.g., computer science, business and management, health/medical sciences, and engineering). As can be seen from Table 4, the most frequently author-assigned keywords to documents citing IS periodicals in 1997-2006 are related to the Internet, information retrieval, knowledge management, electronic commerce, information technology, the Web, digital libraries, and

similar topics. Second, the expansion of ISI's coverage of domains cognate to information studies. Table 5 shows that ISI's coverage of 19 of the 50 most frequent importers from information studies began in the 1990s. Consider the case of *Lecture Notes in Computer Science*, the heaviest importer from IS, which has seen a significant increase in the number of its indexed items in ISI, rising from fewer than 600 records per year in the 1980s to over 11,000 per year for the period 2000 to 2006. Similar trends were found in the case of *Lecture Notes in Artificial Intelligence*, the second most frequent importer from IS.

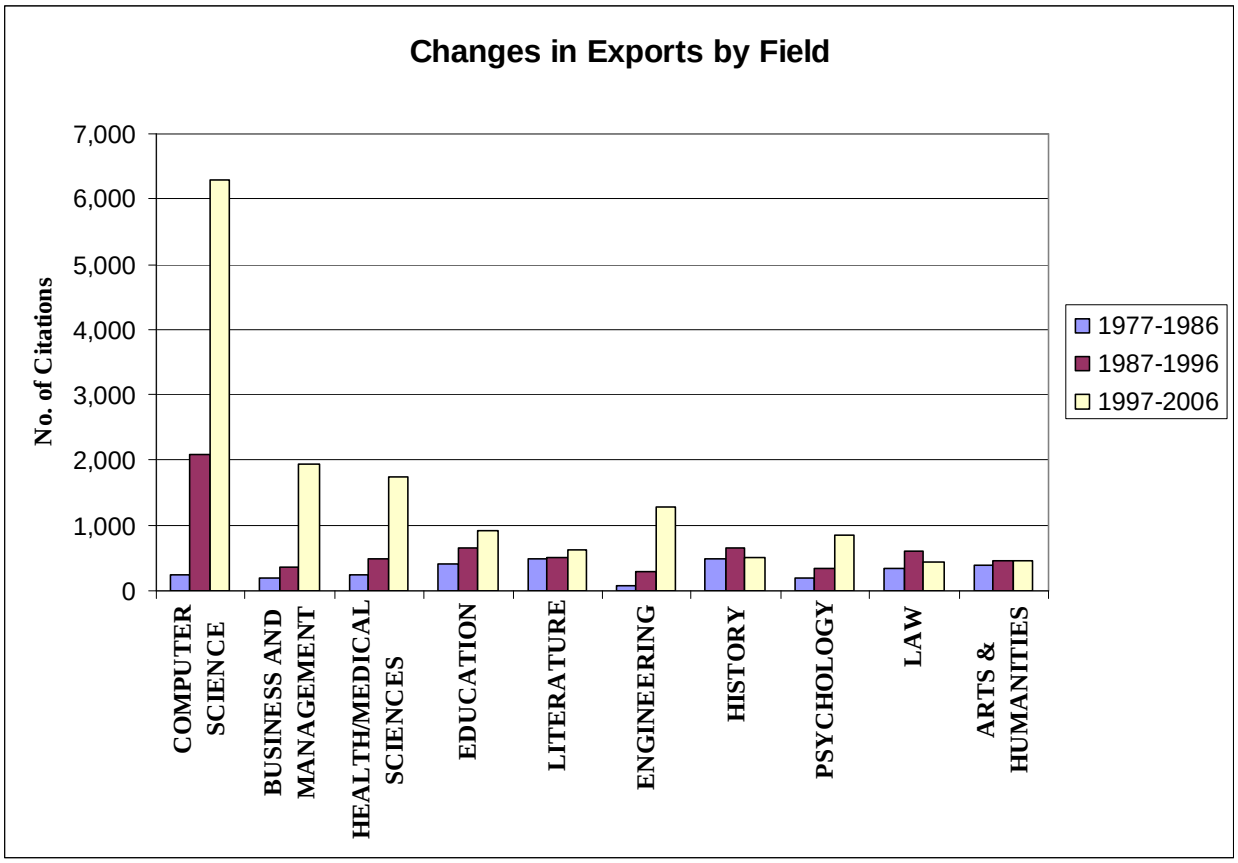

Figure 2. Top-10 importers from information studies by subject category and time period

Literature, history, law, and the arts and humanities have not dropped in the rankings because the scholarly literature of information studies is no longer of interest to scholars in these disciplines. Rather, it is because scholars from other disciplines (e.g., computer science, business

and management, health and medical sciences, and engineering) are now importing ideas and techniques more heavily than previously from IS (see Figure 2 and, for more detail, Table 6).

Our results show that the ranking of importers from IS is statistically significantly different for all pairs of time periods (i.e., 1977-1986 and 1987-1996, 1977-1986 and 1997-2006, and 1987-1996 and 1997-2006)—with Spearman rank order correlation coefficients of 0.672, -0.503, and -0.018, respectively.

Imports

As mentioned earlier, the 48,441 IS articles examined here have cited tens of thousands of unique sources: 566,000 in total. For practical reasons, we limited our analysis to the 200 cited sources. Table 7 shows a breakdown of the subject classification of these 200 cited sources. Over the past 30 years there has been a significant increase in the number of highly cited business and management, computer science and engineering, health/medical sciences, and communication studies titles at the expense of information studies, sociology, statistics, and education titles. The number of IS titles among the top-200 most frequently cited periodicals dropped from 124 (62%, for the period 1977-1986) to 105 (52%, for 1997-2006). As with exports from IS, the striking increase in imports to IS from computer science and engineering, business and management, and health/medical sciences can be explained in large measure by advances in information technology generally and the Internet (and Web) specifically.

CONCLUSION

Our data present a rather different picture from that drawn by Cronin and Pearson (1990). In fairness, their study looked at the export performance of only a handful of grandees in information science: a comparatively small sample, moreover one drawn from a sub-domain of information studies. Additionally, Cronin and Pearson were writing prior to the widespread

adoption of the Internet and the Web. The pace and scale of developments in internetworking since then have brought about a kind of simultaneous intellectual fission and fusion within academia; that is to say, elements of IS have spun off into neighboring fields while IS itself enthusiastically absorbs elements of domains with overlapping or complementary interests in information technology and systems. Information studies may be competing for space with other established and emergent fields, but the ecology of information-related disciplines (to mix metaphors) has expanded, creating opportunities for growth along with well-documented jurisdictional and turf challenges (e.g., Cronin, 2002).

Our data permit two summary assertions: a) IS has become a much more successful exporter of ideas than in the recent past, a point graphically illustrated in Figure 1, and b) IS is less introverted than before, drawing more heavily on the literature of such disciplines as computer science and engineering on the one hand and business and management on the other, as Table 7 demonstrates. At the same time, fewer sociology and education titles are featured in the top-200 most frequently cited periodicals. These developments are mirrored in recent hiring trends within information studies programs; a growing number of the full-time faculty have disciplinary backgrounds/terminal degrees in domains other than IS, a clear case, if you will, of requisite variety. In conclusion, and to return to the economic metaphor that was our point of departure, IS has in the past decade or so become at once a more successful exporter and also a more welcoming importer of intellectual goods trading with an expanding array of partners.

ACKNOWLEDGMENT

We are grateful to Debora Shaw and three anonymous referees for their comments.

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White, H. D. (2004). Citation analysis and discourse analysis revisited. *Applied Linguistics, 25*(1), 89-116.

Table 1. Information studies periodicals used to identify exports

Acquisitions Librarian
Advances in Classification Research
Advances in Librarianship
Advances in Library Administration and Organization
Advances in Library and Information Science
Advances in Library Automation and Networking
Advances in Library Resource Sharing
Advances in Serials Management
African Journal of Library, Archives and Information Science
Alabama Librarian
American Archivist
American Libraries*
Anales de Documentacion*
Annals of Library and Information Studies*
Annual Review of Information Science and Technology
Archival Issues*
Archival Science*
Archivaria*
Archives (British Records Association)
Archives and Manuscripts
Archives et Bibliotheques de Belgique*
Arkansas Libraries
ARSC Journal*
Art Documentation*
Art Libraries Journal*
Aslib Proceedings
Australasian Public Libraries and Information Services
Australian Academic & Research Libraries*
Australian Library Journal
Behavioral & Social Sciences Librarian
Bibliotekarz
Bibliotekovedenie*
Bibliotheek- & Archiefgids*
Bibliothek Forschung und Praxis
Bibliothek und Wissenschaft
Bogens Verden tidsskrift for kultur og litteratur
Bok og Bibliotek*
Bowker Annual*
BuB Forum fur Bibliothek und Information*
Bulletin des Bibliotheques de France
Bulletin of the American Society for Information Science and Technology*
California Librarian
Canadian Journal of Information
Canadian Library Journal
Cataloging & Classification Quarterly
Catalogue & Index
Catholic Library World
Choice
Ciencia da Informacao
Ciencias de la Informacion*
Collection Building
Collection Management*
College & Research Libraries
College & Research Libraries News
College & Undergraduate Libraries
Colorado Libraries
Computers in Libraries*
Current Studies in Librarianship
Cybermetrics
Der Bibliothekar Zeitschrift fur das Bibliothekswesen
DF Revy
D-Lib Magazine
Document Delivery World*
Documentaliste - Sciences de l'Information*
Documentation et Bibliotheques*
Drexel Library Quarterly
DttP
Econtent*
Education for Information
Education Libraries
Education Libraries Journal*
Electronic Library
FID Review*
First Monday
Florida Libraries
FLQ*
Georgia Library Quarterly*
Government Information Quarterly*
Harvard Library Bulletin*
Health Information and Libraries Journal*
Herald of Library Science
HLA Journal*
Horn Book Magazine
IASLIC Bulletin
IATUL Proceeding*
Idaho Librarian
IFLA Journal*
Illinois Libraries
Indexer
Indian Librarian
Indiana Libraries*
Inform: The Magazine of Information*
Information - Wissenschaft und Praxis*
Information Development
Information Outlook*
Information Processing & Management*
Information Reports*
Information Research
Information Services & Use*
Information Society
Information Studies
Information Technology and Libraries*
Information Technology-Research Development

Information Today
InfoTrend*
Inspel
Interlending & Document Supply*
International Cataloguing and Bibliographic Control*
International Information & Library Review*
International Journal of Information Management*
International Journal of Legal Information*
Internet and Higher Education*
Internet Reference Services Quarterly
Internet Research*
Iowa Library Quarterly
JISSI
Journal of Academic Librarianship
Journal of Business & Finance Librarianship
Journal of Documentation
Journal of East Asian Libraries
Journal of Education for Library and Information Science*
Journal of Educational Media and Library Sciences*
Journal of Electronic Publishing
Journal of Global Information Management
Journal of Government Information
Journal of Hospital Librarianship
Journal of Information Ethics
Journal of Information Science*
Journal of Information, Communication and Library Science
Journal of Interlibrary Loan, Document Supply & Electronic Reserves*
Journal of Internet Cataloging
Journal of Librarianship and Information Science*
Journal of Library Administration
Journal of Library and Information Science
Journal of Library Services for Distance Education
Journal of Research Communication Studies
Journal of Scholarly Publishing*
Journal of the American Society for Information Science*
Journal of the Medical Library Association*
Journal of the Society of Archivists
Journal of Youth Services in Libraries*
Judaica Librarianship*
Kentucky Libraries*
Knjiznica
Knowledge Organization*
Knowledge Quest*
Konyvtari Figyelo*
LASIE
Law Library Journal
Learned Publishing*
Legal Information Management*
Legal Reference Services Quarterly
LIBER Quarterly*
Libraries & the Cultural Record*
Library & Archival Security*
Library & Information Science Research*
Library + Information Update
Library Administration and Management*
Library and Information Research*
Library and Information Science
Library Association Record
Library Collections Acquisitions & Technical Services*
Library Computing*
Library Hi Tech
Library Hi Tech News
Library History
Library Hotline
Library Issues
Library Journal
Library Management*
Library Mosaics
Library of Congress Information Bulletin*
Library Philosophy and Practice
Library Quarterly
Library Resources & Technical Services*
Library Review
Library Technology Reports
Library Trends
Libres Library and Information Science Research Electronic Journal
Libri
Link-Up
Louisiana Libraries*
Lucknow Librarian
Malaysian Journal of Library and Information Science
Medical Reference Services Quarterly
Mezhdunarodnyi Forum po Informatsii*
Michigan Librarian*
Microform and Imaging Review*
Minnesota Libraries
Mississippi Libraries*
Missouri Library World*
Mousaion
Multimedia World*
Music Reference Services Quarterly
Nebraska Library Association Quarterly*
New Jersey Libraries
New Library World*
New Review of Academic Librarianship*
New Review of Children's Literature and Librarianship*
New Zealand Libraries
Newsletter on Intellectual Freedom
Nigerian Libraries
Nordisk Tidskrift foer Bok- och Bibliotekshistoria*
North Carolina Libraries
Notes
OCLC Systems and Services*
Ohio Libraries*

Online
Online Information Review*
Open vaktijdschrift voor bibliothecarissen, literatuuronderzoekers en documentalisten*
Pakistan Library & Information Science Journal*
Personnel, Training and Education*
PNLA Quarterly
Portal-Libraries and the Academy
Private Library
Probleme de Informare si Documentare*
Proceedings of the ACM/IEEE Joint Conference on Digital Libraries*
Proceedings of the American Society for Information Science*
Profesional de la Informacion*
Program-Automated Library and Information Systems*
Progressive Librarian
ProLibris*
Public - Access Computer Systems Review
Public Libraries*
Public Library Journal
Public Library Quarterly
Public Services Quarterly*
Publishers Weekly
Publishing Research Quarterly*
Quarterly Bulletin of the International Association of Agricultural Information Specialists*
RBM: A Journal of Rare Books, Manuscripts and Cultural Heritage*
Reference & User Services Quarterly*
Reference Librarian
Reference Services Review
Research Evaluation
Research in Librarianship
Research Strategies
Resource Sharing & Information Networks*
Restaurator-International Journal for the Preservation of Library and Archival Material
Revista Espanola de Documentacion Cientifica*
Rural Libraries
Scandinavian Public Library Quarterly*
School Librarian*
School Libraries in Canada*
School Libraries Worldwide
School Library Journal*
School Library Media Research*
Science & Technology Libraries
Scientometrics
Searcher
Serials Librarian
Serials Review
Shelflife*
South African Journal of Library and Information Science*
SRELS Journal of Information Management*
Studies in Library Management
Teacher Librarian*
Technical Services Quarterly
Technicalities
Tennessee Libraries*
Texas Library Journal
Unabashed Librarian
UNESCO Journal of Information Science*
Urban Library Journal*
Utah Libraries
Vine: The Journal of Information and Knowledge Management Systems
Virginia Libraries*
Vjesnik Bibliotekara Hrvatske
Voice of Youth Advocates
Wilson Library Bulletin*
Wisconsin Library Bulletin
World Libraries*
World Library and Information Congress
Zeitschrift fur bibliothekswesen und bibliographie*
Zentralblatt fur Bibliothekswesen

***Journals that have changed names once or more since their creation.**

Table 2. Information studies periodicals used to identify imports

Rank	Source Name	Number of articles, conference papers, and review articles in ISI database			
		1977-1986	1987-1996	1997-2006	Total
1	Library Journal	911	991	1,281	**3,183**
2	Journal of the American Society for Information Science and Technology (Formerly until 2000: Journal of the American Society for Information Science; 1970: American Documentation; and 1942: Journal of Documentary Reproduction)	424	590	1105	**2,119**
3	Scientometrics	248	650	963	**1,861**
4	Proceedings of the American Society for Information Science and Technology Annual Meeting (Formerly until 2001: Proceedings of the Annual Meeting of the American Society for Information Science; 1973: Proceedings of the American Society for Information Science; 1967: Proceedings of the American Documentation Institute)	747	353	444 Coverage dropped 2004	**1,544**
5	Online	352	709	463	**1,524**
6	EContent (Formerly until 1999: Database)	246	640	547	**1,433**
7	Information Processing & Management (Formerly until 1974: Information Storage and Retrieval)	355	509	550	**1,414**
8	Journal of Academic Librarianship	328	411	522	**1,261**
9	Aslib Proceedings	512	380	364	**1,256**
10	Journal of the Medical Library Association (Formerly until 2002: Bulletin of the Medical Library Association)	311	421	493	**1,225**
11	Library Trends	401	407	408	**1,216**
12	Government Information Quarterly (Formerly until 1994: Government Publications Review)	401	434	247	**1,082**
13	Journal of Information Science (Formerly until 1978: Information Scientist)	292	353	423	**1,068**
14	College & Research Libraries	366	374	325	**1,065**
15	Wilson Library Bulletin	415	605	Ceased publication 1995	**1,020**
16	Serials Librarian	333	573	113	**1,019**
17	Reference & User Services Quarterly (Formerly until 1997: RQ)	368	339	295	**1,002**
18	Library Collections, Acquisitions, and Technical Services (Formerly until 1999: Library Acquisitions: Practice and Theory)	259	411	319	**989**
19	Law Library Journal	298	324	238	**860**
20	Online Information Review (Formerly until 1999: Online & CD-ROM Review; 1992: On-line Review)	215	256	360	**831**
21	Electronic Library	57	315	415	**787**
22	Journal of Scholarly Publishing (Formerly until January 1994: Scholarly Publishing)	313	261	180	**754**
23	Library Resources & Technical Services	302	253	196	**751**
24	Information Technology and Libraries (Formerly until 1982: Journal of Library Automation)	207	286	250	**743**
25	Libri	232	247	251	**730**
26	Zentralblatt fur Bibliothekswesen	511	201 Merged in 1990 with Zeitschrift fuer Bibliothekswesen und Bibliographie		**712**

27	International Information and Library Review (Formerly until 1991: International Library Review)	347	297	57	**701**
28	Information Outlook (Formerly until 1997: Special Libraries)	389	295	Coverage dropped 1996	**684**
29	International Journal of Information Management (Formerly until 1985: Social Science Information Studies)	85 Coverage started with vol. 2 (1982)	246	324	**655**
30	Journal of Documentation	146	144	281	**571**
31	Zeitschrift fur Bibliothekswesen und Bibliographie	171	163	231	**565**
32	Canadian Library Journal	386	178	Ceased publication 1992	**564**
33	Program: Electronic Library and Information Systems (Formerly until 1997: Program: Automated Library and Information Systems; 1979: Program: News of Computers in Libraries)	136	193	226	**555**
34	Library Computing (Formerly until 1998: Library Software Review; 1984: Software Review)	210	275	68	**553**
35	Journal of Education for Library and Information Science (Formerly until 1984: Journal of Education for Librarianship)	196	275	72	**543**
36	Library & Information Science Research (Formerly until 1983: Library Research)	143	172	203	**518**
37	Interlending & Document Supply (Formerly until 1983: Interlending Review; 1978: BLL Review; January 1973: NLL Review)	81	185	246	**512**
38	The American Archivist	219	287	Coverage dropped 1995	**506**
39	Journal of Librarianship and Information Science (Formerly until 1991: Journal of Librarianship)	170	155	169	**494**
40	Bulletin of the American Society for Information Science	109 Coverage began with vol. 13 (1983)	350	31 Coverage dropped 1997	**490**
41	IFLA Journal	221	263	Coverage dropped 1995	**484**
42	FID Review (Formed by the merger of International Forum of Information and Documentation (1975-1999) and FID Bulletin (1960-1999), which was formerly until 1997: FID News Bulletin)	258	193	30 Coverage dropped 1999	**481**
43	Library Quarterly	184	133	158	**475**
44	Internet Research (Formerly until 1993: Electronic Networking)	Coverage began with vol. 3 (1993)	97	369	**466**
45	Libraries & the Cultural Record (Formerly until 2006: Libraries & Culture; 1987: Journal of Library History; 1973: Journal of Library History, Philosophy, and Comparative Librarianship; 1972: Journal of Library History)	195	124	139	**458**
46	Knowledge Organization (Formerly until 1992: International Classification)	125	182	118	**425**
47	Learned Publishing	Coverage began with vol. 7 (1994)	66	336	**402**
48	Journal of the Society of Archivists	58	172	169	**399**
49	Harvard Library Bulletin	124	169	66	**359**
50	Notes: : The Quarterly Journal of the Music Library Association	82	96	164	**342**

51	Canadian Journal of Information and Library Science (Formerly until 1993: Canadian Journal of Information Science)	119	130	84	**333**
52	Publishing Research Quarterly (Formerly until 1991: Book Research Quarterly)	Coverage began with vol. 10 (1994)	81	188 Coverage dropped 2004	**269**
53	Annual Review of Information Science and Technology	96	86	96	**278**
54	Journal of Micrographics (Changed names in in 1983 to Journal of Information and Image Management and in 1986 to Inform)	259	Coverage dropped 1981		**259**
55	Information Society: An International Journal	Coverage began with vol. 13 (1997)		257	**257**
56	Drexel Library Quarterly	256	Ceased publication 1986		**256**
57	Library and Information Science	127	83	44	**254**
58	Journal of Government Information	Coverage began with vol. 21 (1994)	86	163	**249**
59	Information-Wissenschaft und Praxis (Formerly until 1997: Nachrichten fuer Dokumentation)	Coverage began with vol. 48 (1998) and dropped with vol. 54 (2003)		247	**247**
60	Library Hi Tech	Coverage began with vol. 13 (1995)	110	135	**245**
61	Restaurator: International Journal for the Preservation of Library and Archival Material	Coverage began with vol. 14 (1993)	64	179	**243**
62	Education for Information	56	162	10	**228**
63	Unesco Journal of Information Science, Librarianship and Archives Administration (Formerly until 1978: Unesco Bulletin for Libraries)	208	Ceased publication 1983		**208**
64	Behavioral & Social Sciences Librarian	100	63	38	**201**
65	Portal: libraries and the academy	Coverage began with vol. 2 (2002)		165	**165**
66	Information Research: An International Electronic Journal	Coverage began with vol. 8 (2003)		149	**149**
67	Research Evaluation	Coverage began with vol. 9 (2000)		139	**139**
68	Journal of Information Ethics	Coverage began with vol. 4 (1995)	32	102 (coverage dropped 2004)	**134**
69	Library Science with a Slant to Documentation (Changed names in 1988 to Library Science with a Slant to Documentation and Information Studies and in 2000 to SRELS Journal of Information Management)	102	Coverage dropped 1981		**102**
70	Journal of Research Communication Studies (Merged in 1982 with Scientometrics)	99	Merged in 1982 with Scientometrics		**99**
71	Health Information and Libraries Journal	Coverage began with vol. 22 (2005)		98	**98**
72	Archives (British Records Association)	80	11	Coverage dropped 1988	**91**
73	Science & Technology Libraries	Coverage began with vol. 16 (1997)		63	**63**
74	Profesional de la Informacion, El (Formerly until 1998: Information World en Espanol)	Coverage began with vol. 15 (2006)		52	**52**
75	Serials Review	Coverage began with vol. 31 (2005)		46	**46**
76	Microcomputers for Information Management (Changed names in 1996 to Internet and Higher Education)	45	Only first two volumes were covered (1984-1985)		**45**
77	Journal of Global Information Management	Coverage began with vol. 13		29	**29**

		(July-Sep 2005)			
78	Information Technology: Research, Development, Applications (Formerly until 1983: Information Technology, Research and Development)	26	Coverage began with issue 1 of vol. 2 (January 1983); Ceased publication 1984; Incorporated with Information Processing & Management (1984)		**26**
79	Searcher: The Magazine for Database Professionals	Selectively covered from vol. 6 (1998) to present		15	**15**
80	Information Research and Resource Reports	10	Only reports 3-5 were covered (1984)		**10**
Total*		15,022	16,911	16,508	48,441

*The number of titles covered was 62 during 1977-1986, 61 during 1987-1996, and 65 during 1997-2006.

Table 3. Exports from information studies (based on an examination of 54,181 papers that have cited 275 IS periodicals between 1977 and 2006)

Time Period	Information Studies			Non-Information Studies			Total No. of Citing papers
	No. of citing papers	% of total	Increase over previous decade	No. of citing papers	% of total	Increase over previous decade	
1977-1986	7,311	65%		3,982	35%		**11,293**
1987-1996	8,800	58%	20%	6,302	42%	58%	**15,102**
1997-2006	9,707	35%	10%	18,079	65%	187%	**27,786**
1977-2006	**25,818**	**47.7%**		**28,363**	**52.3%**		**54,181**

Table 4. Frequency distribution of keywords assigned by ISI to papers importing from information studies

Rank	Count	Keywords
1	709	INTERNET
2	545	INFORMATION RETRIEVAL
3	191	KNOWLEDGE MANAGEMENT
4	185	ELECTRONIC COMMERCE
5	154	LIBRARIES
6	151	INFORMATION TECHNOLOGY
7	149	WORLD WIDE WEB
8	141	DIGITAL LIBRARIES
9	135	EVALUATION
10	132	INFORMATION SYSTEMS
11	104	INNOVATION
12	101	DATA MINING
13	93	INFORMATION MANAGEMENT
14	93	USER STUDIES
15	90	BIBLIOMETRICS
16	89	RESEARCH
17	87	DATABASES
18	87	WORLD WIDE WEB
19	86	INFORMATION
20	80	E-COMMERCE
21	80	SEARCH ENGINES
22	78	ACADEMIC LIBRARIES
23	78	INTERLENDING
24	76	ELECTRONIC PUBLISHING
25	75	CITATION ANALYSIS

Table 5. Top-50 importers from information studies (1977-2006)

Overall Rank	Rank Among Importers	Citation Count	Citing Source Name	Year Added to ISI (vol.)
1	1	1850	Lecture Notes in Computer Science*	1981
24	2	425	Lecture Notes in Artificial Intelligence	1991
34	3	317	Nauchno-Tekhnicheskaya Informatsiya Seriya 1 and 2	1967 (11)
48	4	214	Information & Management (Formerly until 1977: Management Datamatics; 1975: Management Informatics)	1974 (3)
49	5	203	Journal of the American Medical Informatics Association	1994 (1)
50T	6T	202	Journal of Chemical Information and Modeling (formerly until 2005: Journal of Chemical Information and Computer Sciences; until 1975: Journal of Chemical Documentation)	1961 (1)
50T	6T	202	Research Policy	1974 (3)
53	8	196	International Journal of Human-Computer Studies (formerly until 1993: International Journal of Man-Machine Studies)	1969 (1)
54	9	185	Communications of the ACM	1958 (1)
60	10	158	Current Contents	1969 (11)
62	11	154	Decision Support Systems	1991 (7)
63	12	151	ACM Transactions on Information Systems (formerly until 1988: ACM Transactions on Office Information Systems)	1983 (1)
69	13	112	IEEE Transactions on Systems Man and Cybernetics	1971 (1)
71	14	102	Journal of Computer Information Systems (Formerly until 1985: Journal of Data Education)	1994 (34)
73T	15T	96	European Journal of Information Systems	1995 (4)
73T	15T	96	Information Retrieval	2000 (3)
76	17	92	MIS Quarterly	1984 (8)
79	18	85	Industrial Management & Data Systems	1994 (94)
81	19	83	Behaviour & Information Technology	1985 (4)
82T	20T	82	Computers & Education	1978 (2)
82T	20T	82	Journal of Information Technology	1993 (8)
84	22	81	IEEE Transactions on Knowledge & Data Engineering	1992 (4)
86	23	76	Expert Systems with Applications	1991 (2)
87	24	75	International Journal of Medical Informatics	1997 (44)
88T	25T	72	Academic Medicine (Formerly until 1989: Journal of Medical Education; until 1951: Medical Education; until 1950: Association of American Medical Colleges)	1977 (11)
88T	25T	72	Methods of Information in Medicine	1964 (3)
88T	27T	72	Children's Literature in Education: An International Quarterly	1975 (16)
92T	27T	67	Journal of Management Information Systems	1999 (16)
92T	27T	67	Computers in Human Behavior	1990 (6)
92T	27T	67	International Journal of Technology Management	1994 (9)
95T	31T	64	Computer Networks (Former titles until 1999: Computer Networks and ISDN Systems; until 1985: Computer Networks)	1978 (2)
95T	31T	64	Computer Journal	1958 (1)
97T	33T	62	Interacting with Computers	1992 (4)
97T	33T	62	British Journal of Educational Technology	1971 (2)
97T	33T	62	Social Studies of Science (Formerly until 1975: Science	1971 (1)

			Studies)	
100T	36T	61	Fuzzy Sets and Systems	1980 (3)
100T	36T	61	Technovation	1981 (1)
103	38	60	Journal of Strategic Information Systems	1995 (4)
104	39	58	International Journal of Intelligent Systems	1987 (2)
105T	40T	57	Reading Teacher	1956 (9)
105T	40T	57	Technological Forecasting and Social Change	1969 (1)
105T	40T	57	Information Systems	1978 (3)
105T	40T	57	Information and Software Technology	1987 (29)
109	44	56	Computers and the Humanities	1968 (2)
111	45	55	Information Sciences	1968 (1)
112	46	54	New Media & Society	2001 (3)
113T	47T	51	Social Science Computer Review	1994 (12)
113T	47T	51	IEEE Transactions on Engineering Management	1963 (10)
115T	49T	50	European Journal of Operational Research	1978 (2)
115T	49T	50	Journal of Computer-Mediated Communication	2005 (11)

*A significant portion of citations in the LNCS series are from conference papers dealing with digital libraries and human-computer interaction.

Table 6. Top-10 importers from information studies by subject category and time period

	1977-1986		1987-1996		1997-2006		1977-2007	
	Count	**Rank**	**Count**	**Rank**	**Count**	**Rank**	**Count**	**Rank**
COMPUTER SCIENCE	252	6	2,079	1	6,286	1	8,617	1
BUSINESS AND MANAGEMENT	204	8	371	8	1,927	2	2,502	2
HEALTH/MEDICAL SCIENCES	237	7	477	6	1,745	3	2,459	3
EDUCATION	417	3	655	2	928	5	2,000	4
LITERATURE	489	1	515	5	639	7	1,643	5
ENGINEERING	64	10	296	10	1,280	4	1,640	6
HISTORY	477	2	654	3	498	8	1,629	7
PSYCHOLOGY	195	9	343	9	846	6	1,384	8
LAW	343	5	594	4	426	10	1,363	9
ARTS & HUMANITIES	392	4	458	7	449	9	1,299	10

Table 7. Subject classification of the top-200 periodicals cited in the information studies literature

SUBJECT CATEGORY	**Number of Titles**				**No. and % of change from 1977-1986 to 1997-2006**
	1977-2006	**1977-1986**	**1987-1996**	**1997-2006**	
Information Studies	**114**	124	120	105	-19 (-15%)
Computer Science and Engineering	**29**	27	30	35	+8 (+30%)
Business and Management	**20**	8	15	24	+16 (+200%)
Sciences, Multidisciplinary	**6**	7	6	8	+1 (+14%)
Social Sciences, Interdisciplinary	**6**	8	4	8	+/-0 (0%)
Health/Medical Sciences	**5**	3	5	6	+3 (+100%)
Communication Studies	**4**	2	3	4	+2 (+100%)
Psychology/Cognitive Science	**4**	4	5	5	+1 (+25%)
Sociology	**3**	5	3	2	-3 (-60%)
Education	**2**	3	5	1	-2 (-67%)
Humanities, Interdisciplinary	**2**	2	2	2	+/-0 (0%)
Economics	**1**	1	1	2	+1 (100%)
Informatics	**1**	0	0	1	NA
Law	**1**	1	1	0	-1 (-100%)
Statistics	**1**	3	2	0	-3 (-100%)
Telecommunication	**1**	1		1	+/-0 (0%)
Physics	**0**	1	1	0	-1 (-100%)
Total	**200**	**200**	**203***	**204***	

*These are greater than 200 because of a tie in the number of citations at rank 200.