Measuring Research Impact: A First Approximation of the Achievements of the iSchools in ISI's Information and Library Science Category – An Exploratory Study

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ABSTRACT
In this paper, we analyze those publications of the home institutes of the iSchools that are indexed by Thomson Reuters (ISI) Web of Science in the information science and library science category, and were published between 2000 and 2009.

Categories and Subject Descriptors
Could not find an appropriate ACM category.

General Terms
Measurement.

Keywords
Research evaluation, information and library science, publications, citations, h-index

1. INTRODUCTION
This year the theme of the iConference is iMPACTS, including the research impact of the iSchools [12]. Thus we decided to assess the research impact of the iSchools on information and library science, by retrieving all the items indexed by Thomson Reuters (ISI) Web of Science in the subject category "information and library science" that were published by the iSchools' home institutions in the period 2000-2009. We measured the number of publications, the number of citations, the h-index of the set of retrieved items, the most highly cited item, the most frequently appearing document type and the journal in which the highest number of items were published by the specific institution during the whole period.

This method has limitations it can only approximate the iSchools' research performance. It is quite obvious that some of the iSchools are not very active in the subject area defined by ISI as "information and library science". These schools are probably more active in other areas like computer science or information systems. On the other hand, it is possible that some of the publications of the given university in the subject category "information science and library science" were not produced by members of the iSchool, but rather by members of other departments who publish in journal in the "information science and library science" category. In addition there are indexing mistakes, and sometimes the affiliation of the author does not appear on the paper, and thus are not counted for the given institution. Nonetheless, the results of this exercise can serve as a first estimate.

Early ranking studies were based on perceptions and rankings were provided by survey participants (e.g. [26, 27]). Mulvaney [17] analyzed White's finding and found that perceived quality is associated to some extent with faculty productivity, but this was not the most influential variable. On the other hand Biggs and Bookstein [3] interviewed 45 randomly selected faculty members from ALA accredited schools and asked them what constitutes a high quality MLS program. The only criterion which was mentioned by the majority of the respondents was the presence of faculty members who are active in research and publishing.

Danton [10] reviewed and compared eight early rankings of library and information science schools, some of the rankings were based on perceptions, while others on citation and publication counts. Cronin and Overfelt [9] strongly questioned the perception studies, and conducted a very thorough analysis of a single information and library science school. They reached the conclusion that publication and citation counts are heavily skewed by a few bibliometric stars, supporting the conclusions of Brace [5].

Besides perception based rankings, there were studies based on publication counts only. Boyce and Hendren [4] based their study on data retrieved from Library Literature. They counted publications with and without book reviews. They also normalized the numbers by the number of full time faculty in each of the institutions. Wallace [25] also based his study on data from the Library Literature databases. Varlejs and Dairymple [24] retrieved data from Library Literature, LISA and ISA; while Pettigrew and Nicholls [20] conducted a large study using data from ERIC, LISA, PASCAL, LLIT and SSCI. They reached the conclusion that schools offering PhD programs are more productive than schools without such programs. Meho and Spurgin [15] reviewed several of the earlier studies that aimed to rank library and information science schools based on research productivity. They retrieved data from nine databases to achieve

reasonable coverage of the publications of the top 20 individuals listed in Budd's study.

Quite a number of studies took into account in addition to publication counts citation counts as well. One of the earliest studies of this type was conducted by Hayes [13], who used the Social Science Citation Index (SSCI) as his data source, and covered the years 1965-1980. Budd and Seavey [7] carried out a follow-up study covering the years 1981-1992. They provided publication and citation counts and also normalized data per capita. Budd [6] and Adkins and Budd [1] conducted additional follow-up studies covering the years 1993-1998 and 1999-2004 respectively.

Bates [2] emphasized the need to take into account books when evaluating LIS faculty. Note that books are not indexed by the Web of Science (WOS) and thus are not taken into account in the current study. She combined three types of data: perceptions of quality, publication and citation counts, differentiating between different types of publications: articles, books, edited books or journal issues and book reviews, letters and editorials.

Shaw and Vaughan [23] profiled a "typical" LIS professor, based on his/her publication and citation patterns. Meho and Yang [16] used the Web of Science, Scopus and Google Scholar to rank LIS researchers based on citation counts retrieved from the three citation databases. Seng and Willet [22] examined the citedness of UK library school publications. The citation counts correlated highly with the results of the RAE exercise. Such correlation was also found by Oppenheim [18]

With the introduction of the h-index [14], a number of studies were carried out ranking information scientists in the US and in the UK [8, 19, 21] according to their h-indices.

2. METHODS

The iSchools movement currently has 27 members. For operational reasons we had to combine the outputs of the two Indiana University at Bloomington iSchools, the School of Library and Information Science and the School of Informatics. The reason for this was that we used the OG field tag (organization) of the Web of Science, and did not want to use the SG, the suborganization field tag so as not to decrease the recall (in case authors did not specify the name of their school). For the Indiana University we also added Bloomington to the search, to exclude the publications of the School of Library and Information Science in Indianapolis.

Using the name of the university only, and limiting the search to the subject category "information science and library science" obviously excluded some of the publications of the iSchools and obviously included other publications of the university where the authors were not members of the iSchool. As stated above, this study is only a first approximation of the outputs of the iSchools in the area of information and library science. The publication years were limited to 2000-2009.

For each iSchools we calculated the number of publications, the number of citations, the h and g-index of these publications, the most frequently occurring publication type, and the frequency of the publication type. In addition, we tabulated the most highly cited publication of each iSchool, the number of citations this item received, the most productive faculty member in the category "information science and library science", and the number of his/her publications indexed and the journal in which the iSchool published the largest number of publications.

The h-index for a set of citable items of size N is defined following Hirsch [14] who defined the h-index for authors, as the unique number h, such that h items are cited h times or more, and the remaining N-h items are cited h times or less.

One of the shortcomings of the h-index is that it does not take into account the access citations of the top-cited items. Thus Egghe [11] introduced the g-index. A set of N items has g-index g, if these items are ordered in decreasing order of the number of citations they received and g is the highest rank, such that the top g items received at least g^2 citations.

The data was collected from the Web of Science's Social Science Citation Index, but without the Conference Proceedings Citation Index for the Social Sciences. Thus only proceedings papers indexed by the Social Science Citation Index were included. Data was collected between November 2 and 5, 2009.

3. RESULTS AND DISCUSSION

In Table 1 the publication and citation counts of the home institutions of each of the iSchools (the two Bloomington iSchools have the same home institution) in the subject category "information science and library science" for the year 2000 and 2009 are displayed. In addition the table shows the h and g-indexes and the most frequently occurring publication types.

The results show that the largest number of publications was produced by the University of Illinois, and the largest number of citations was accumulated by the University of Maryland. For a few of the universities the publication and citation counts are extremely low, indicating that even though they have an iSchool they do not publish heavily in the areas of information and library science. They are probably active in other areas relevant to iSchools like computer science and/or information systems.

In terms of the h and g-indexes, the highest numbers were achieved by Indiana University and the University of Maryland respectively. Note the huge difference between the highest h-index (27) and the highest g-index (56). The h-index of the University of Maryland papers was only 21, but because this university's top-cited papers were cited many more than 21 times, the g-index reached the value of 56.

With a few exceptions, the most frequently occurring publication type was "article". Some universities (Drexel, Georgia Tech, Illinois, Penn State and Rutgers) published more book reviews than articles. For Georgia Tech, 66.5% of the publications were book reviews.

Table 1: Publication and citation counts, h and g-index and major publication type of the host institutions in the subject catgory "information science and library science" during the period 2000-2009

University	Abbrev.	Publication count	Citation count	h-index	g-index	Most frequent publication type	Count of most frequent type
University of California, Berkeley	UCBer	102	353	11	18	article	54
University of California, Irvine	UCIrv	70	734	13	26	article	42
University of California, Los Angeles	UCLA	304	1054	16	28	article	112
Carnegie Mellon University	CMU	98	476	11	18	article	58
Drexel University	DRXL	269	1518	18	37	book review	128
Florida State University	FLST	271	1279	15	31	article	140
Georgia Institute of Technology	GTEC	158	207	8	12	book review	105
Humboldt-Universität zu Berlin	HUMB	51	37	5	5	article	28
University of Illinois	ILUC	920	1571	20	28	book review	515
Indiana University, Bloomington	INDB	451	2484	27	41	article	179
University of Maryland	UMLND	388	3689	21	56	article	184
UMBC	UMBC	9	20	3	4	article	5
University of Michigan	Umich	254	1229	18	28	article	130
University of North Carolina	UNC	408	1878	21	36	article	208
University of North Texas	UNT	80	186	7	12	article	37
The Pennsylvania State University	Penn	588	2194	21	39	book review	287
University of Pittsburgh	Pitt	354	1861	22	35	article	150
Royal School of Library and Information Science, Denmark	Denmk	145	980	15	26	article	78
Rutgers, the State University of New Jersey	Rutg	388	1630	19	37	book review	190
University of Sheffield, England	Sheff	206	875	17	22	article	146
Singapore Management University	Sing	7	32	2	5	article	6
Syracuse University	Syrac	190	665	12	20	article	98
University of Texas, Austin	UTA	399	1586	21	31	article	208
University of Toronto	UTor	253	627	12	21	article	104
University of Washington	UW	485	1286	18	30	article	194
Wuhan University, China	Wuhan	43	74	4	7	article	40

Table 2 displays the most highly cited publication of each institution, the number of citations it received and the publication type.

The most highly cited item is by Venkaesh et al. Although Venkatesh was at the time of writing affiliated with the University of Maryland, but he was not at the College of Information Studies, but at the School of Business. Currently he is affiliated with the University of Arkansas.

Among the most highly cited papers, seven of them were published in the MIS Quarterly and five of them in the Journal of American Medical Informatics Association (JAMIA). Neither of these journals are considered to be core information or library science journal. This a well-known problem with the ISI category of information and library science.

The top cited item is responsible on average for 16.40% of the total citations received by the university, the percentage ranges between 87.50% (University of Singapore) and 4.48% (University of Texas at Austin).

Table 2. Most cited publications

Univ.	authors	abbreviated title	source	publ year	TC	publ type
UCBer	Patel, VL; Arocha, JF; Kaufman, DR	Review? A primer on aspects of cognition for medical informatics	JAMIA	2001	40	review
UCIrv	Melville, N; Kraemer, K; Gurbaxani, V	Review: Information technology and organizational performance	MIS QUART	2004	129	review
UCLA	Bates, DW; Cohen, M; Leape, LL; Overhage, JM; Shabot, MM; Sheridan, T	White paper - Reducing the frequency of errors in medicine using information technology	JAMIA	2001	191	article
CMU	Chen, PY; Hitt, LM	Measuring switching costs and the determinants of customer retention in Internet-enabled businesses	INF SYST RES	2002	73	article
DRXL	Gefen, D; Karahanna, E; Straub, DW	Trust and TAM in online shopping	MIS QUART	2003	348	review
FLST	McKnight, DH; Choudhury, V; Kacmar, C	Developing and validating trust measures for e-commerce	INF SYST RES	2002	225	review
GTEC	Dietz, JS; Chompalov, I; Bozeman, B; Lane, EO; Park, J	Using the curriculum vita to study the career paths of scientists and engineers	SCIENTOMETRICS	2000	23	article
HUMB	Fritsche, L; Schlaefer, A; Budde, K; Schroeter, K; Neumayer, HH	Recognition of critical situations from time series of laboratory results by case-based reasoning	JAMIA	2002	7	article
ILUC	Ranganathan, C; Ganapathy, S	Key dimensions of business-to-consumer web sites	INF& MAN	2002	103	article
INDB	Kling, R; McKim, G	Not just a matter of time: Field differences and the shaping of electronic media in supporting scientific communication	JAMIA	2000	110	article
UMLND	Venkatesh, V; Morris, MG; Davis, GB; Davis, FD	User acceptance of information technology	MIS QUART	2003	651	article
UMBC	Rubenstein-Montano, B; Buchwalter, J; Liebowitz, J	Knowledge management: A US Social Security Administration case study	GOV INF QUART	2001	5	article
Umich	Saha, S; Saint, S; Christakis, DA	Impact factor: a valid measure of journal quality?	J MED LIBR ASS	2003	89	article
UNC	Gold, AH; Malhotra, A; Segars, AH	Knowledge management: An organizational capabilities perspective	J MAN INF SYST	2001	171	review
UNT	Beatty, RC; Shim, JP; Jones, MC	Factors influencing corporate web site adoption	INF& MAN	2001	43	article
Penn	Jansen, BJ; Spink, A; Saracevic, T	Real life, real users, and real needs	IP&M	2000	331	article
Pitt	Wade, M; Hulland, J	Review: The resource-based view and information systems researchresearch	MIS QUART	2004	109	review
Denmk	Bjorneborn, L; Ingwersen, P	Perspectives of webometrics	SCIENTOMETRICS	2001	80	article
Rutg	Jansen, BJ; Spink, A; Saracevic, T	Real life, real users, and real needs	IP&M	2000	331	article
Sheff	Thomas, O; Willett, P	Webometric analysis of departments of librarianship and information science	J INF SCI	2000	43	article
Sing	Garud, R; Kumaraswamy, A	Vicious and virtuous circles in the management of knowledge	MIS QUART	2005	28	review
Syrac	Benaroch, M; Kauffman, RJ	Justifying electronic banking network expansion using real options analysis	MIS QUART	2000	66	article
UTA	Barua, A; Konana, P; Whinston, AB; Yin, F	An empirical investigation of net-enabled business value	MIS QUART	2004	71	review
UTor	Fischer, S; Stewart, TE; Mehta, S; Wax, R; Lapinsky, SE	Handheld computing in medicine	JAMIA	2003	89	review
UW	Saha, S; Saint, S; Christakis, DA	Impact factor: a valid measure of journal quality?	J MED LIBR ASS	2003	89	article
Wuhan	Zhou, QM; Liu, XJ	Error assessment of grid-based flow routing algorithms used in hydrological models	INT J GEO INT SCI	2002	17	article

In Table 3 we show the most productive authors, the number of publications and the percentage out of the total number of publications of the university. Note that the publication types include book reviews and editorials.

Table 3. The most productive authors

University	most productive author	no. publ	% of total publ.
UCBer	BUCKLAND, M	19	18.63%
UCIrv	KRAEMER, KL	13	18.57%
UCLA	FURNER, J	17	5.59%
CMU	ALEXANDER, J	9	9.18%
DRXL	LEWIS, AM	13	4.83%
FLST	MCCLURE, CR	37	13.65%
GTEC	RENFRO, C	30	18.99%
HUMB	SEADLE, M	15	29.41%
ILUC	FAIRCHILD, CA	346	37.61%
INDB	CRONIN, B	78	17.29%
UMLND	DOPP, BJ	31	7.99%
UMBC	HOLDEN, SH	3	33.33%
Umich	SEEMAN, C	13	5.12%
UNC	KUHLMAN, JR	53	12.99%
UNT	GREISDORF, H	8	10.00%
Penn	LUMPKINS, CL	56	9.52%
Pitt	SPINK, A	25	7.06%
Denmk	HJORLAND, B	40	27.59%
Rutg	MAXYMUK, J	109	28.09%
Sheff	FORD, N	29	14.08%
Sing	PAN, G	3	42.86%
Syrac	NICHOLSON, S	21	11.05%
UTA	PETERS, SL	49	12.28%
UTor	DILEVKO, J	28	11.07%
UW	SZATMARY, D	82	16.91%
Wuhan	QIU, JP	5	11.63%

The most productive author was C. A. Fairchild, however one must note that 315 out of the 316 publications were book reviews. These book reviews were written by Constance A. Fairchild a reference librarian at the University of Illinois Library in Urbana-Champaign. Her reviews constitute 37.61% of the total publications of the University of Illinois in the category "information science and library science". Thus we see that some of the more visible authors are not from the iSchools. Next, in Table 5 we present the journals with the largest number of publications for each university.

Library Journal was by far the most productive journal in 14 cases. We see here some local effects, two of the European institutions (Sheffield and the Royal School) published extensively in the British Journal of Documentation, while faculty from the University of Toronto showed a preference for the Canadian Journal of Information and Library Science.

Table 4. Most productive journals

Univ.	most prod. journal	# publ journal	% of total publ.
UCBer	LIBRARY JOURNAL	11	10.78%
UCIrv	INFORMATION SOCIETY	13	18.57%
UCLA	LIBRARY QUARTERLY	74	24.34%
CMU	COLLEGE & RESEARCH LIBRARIES; INFORMATION SYSTEMS RESEARCH	13	13.27%
DRXL	LIBRARY JOURNAL	106	39.41%
FLST	LIBRARY QUARTERLY	52	19.19%
GTEC	LIBRARY JOURNAL	100	63.29%
HUMB	LIBRARY HI TECH	20	39.22%
ILUC	LIBRARY JOURNAL	442	48.04%
INDB	LIBRARY JOURNAL	107	23.73%
UMLND	LIBRARY JOURNAL	53	13.66%
UMBC	GOVERNMENT INFORMATION QUARTERLY	3	33.33%
Umich	LIBRARY JOURNAL	40	15.75%
UNC	LIBRARY JOURNAL	66	16.18%
UNT	PROCEEDINGS OF THE ASIST ANNUAL MEETING	26	32.50%
Penn	LIBRARY JOURNAL	157	26.70%
Pitt	LIBRARY JOURNAL	74	20.90%
Denmk	JOURNAL OF DOCUMENTATION	38	26.21%
Rutg	LIBRARY JOURNAL	147	37.89%
Sheff	JOURNAL OF DOCUMENTATION	35	16.99%
Sing	MIS QUARTERLY	2	28.57%
Syrac	LIBRARY JOURNAL	33	17.37%
UTA	LIBRARY JOURNAL	64	16.04%
UTor	CANADIAN JOURNAL OF INFORMATION AND LIBRARY SCIENCE	50	19.76%
UW	LIBRARY JOURNAL	121	24.95%
Wuhan	SCIENTOMETRICS	9	20.93%

4. CONCLUSIONS

We view this study as an exploratory study. Its limitations were clearly stated in the methods section. We recommend conducting further studies, where the searches are conducted for the individual faculty members of each of the iSchools, to get a more exact picture of their achievements. These way only publications

of the iSchools members, irrespective of the ISI category they are assigned to will be retrieved. We recommend calculating a number of measures, similar to the measures that appeared in the current study.

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