

RESEARCH TRENDS IN INFORMATION LITERACY: A BIBLIOMETRIC STUDY

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This study presents a bibliometric analysis of scientific output in the area of 'Information Literacy' (IL), the aim being to offer an overview of research trends in this field and characterize its most important aspects and their evolution over the last quarter of the 20th century. The analysis makes use of LISA Plus database, the search being restricted to published journal articles and which contain the terms 'Information Literacy'. The various analyses focus on the presentation of publications, frequencies and percentages, as well as the application of Bradford's law of scattering and Lotka's law.

KEYWORDS/DESCRIPTORS: Information literacy, Bibliometric study

1 INTRODUCTION

Information managers have adopted quantitative methods in recent years in order to evaluate library resources and services more objectively and effectively. Bibliometrics, as a sub discipline in information science, is one of the quantitative techniques first known to have been applied by E. J. Cole and N.B. Eales in 1917, who designated it as 'Statistical Bibliography'. Alan Pritchard in 1969 coined the term 'Bibliometrics'. The term 'Librametry' was given by S. R. Ranganathan in 1948 during the ASLIB conference. Other terms used for it are 'Scientometrics', 'Informetrics', and 'Webometrics', etc. British Standards Institute [1] defines bibliometrics as 'the study of the use of documents and pattern of publications in which mathematical and statistical methods are applied'.

It is basically a quantitative technique of citations analysis to measure the records of human communication through the process of collection, counting, analysis and interpretation of citations given in various types of literature and thereby helping in identification of significant sources of information. It also helps in planning and organization of resource sharing, networking and

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consortium. Therefore it is an emerging thrust unit of research in the field of library and information science. Present study was taken up to quantify and map the world scientific output in the area 'Information Literacy', the aim being to offer an overview of research activity and to characterise its most important aspects and their evolution over the last quarter of the 20th century, thus providing data regarding the research trends at the beginning of the 21st century.

Simply defined, information literacy is the ability to access, evaluate and use information from a variety of sources. An information literate person, according to Chowdhury and Chowdhury [2] 'is expected to have acquired the necessary skills to retrieve information from a variety of sources, printed as well as electronic, to meet his or her information needs at any given point of time'. Acquiring such skills will enable information professionals as well as end-users, to identify and retrieve information from the most appropriate sources in the most appropriate form. Such skills of searching the information for the best use are known as 'Information Literacy' (IL). American Library Association Presidential Committee of Information Literacy [3] recommended in the report that 'an information literate person must be able to recognize when information is needed and have the ability to locate, evaluate and use effectively the needed information'.

2 OBJECTIVES OF STUDY

The specific objective of the present study addresses the following aspects:

1. Temporal evolution of number of publications;
2. Output of different journals with their rank and the application of Bradford's law as an indicator of the dispersion scientific information;
3. Number of authors contributing each article and authorship pattern;
4. Author productivity through the application of Lotka's law and most prominent authors in the area of IL;
5. Output with respect of language; and
6. Global distribution of journals.

3 METHODOLOGY

The documents included in the present study were identified via LISA Plus, an electronic data base of Library Information Science Abstracts (LISA)

published by Bowker-Saur, UK, covers the documents in the field of librarianship and information science. The database lists over 550 periodicals from more than 60 countries in more than 20 different languages.

The restrictions placed on the search concerned the following aspects:

- a) Terminology: with the aim of covering all the available citations on IL, using the term 'Information Literacy' searched the above-mentioned database;
- b) Time Period: Given that the objective of the present study was to analyse all the journal articles published on IL, the search was open and not limited to any time period; and
- c) Types of documents: Given the enormous of documents concerning IL it was decided to limit this study to published journal articles. Therefore, books, proceedings, book reviews, etc. were all excluded.

4 DATA ANALYSIS

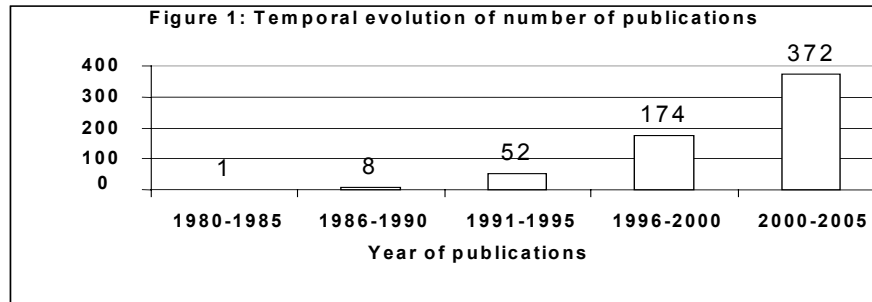
The analysis of the present study focused mainly on the frequencies and percentages of publications. In addition, however, the productivity of journals and authors was described using Bradford's law of scattering and Lotka's law respectively.

As an indicator of the dispersion of scientific output, Bradford [4] [5] proposed a model of concentric productivity zones with a decreasing information density. In other words, each zone or core contains a similar number of articles, but the number of journals in which these are published increases from one zone to the next according to the expression $1, n, n^2, \dots$; in this way, a group of journals dedicated more specifically to the subject of interest can be distinguished.

Lotkas' law [6], whose sole requirement is that the number of scientists who contributed 'n' papers must be $1/n^2$ of those who contributed only one paper. The exponent of 'n' is often fixed at 2, in which case the law is known as the inverse square law of scientific productivity.

4.1 Year of Publications

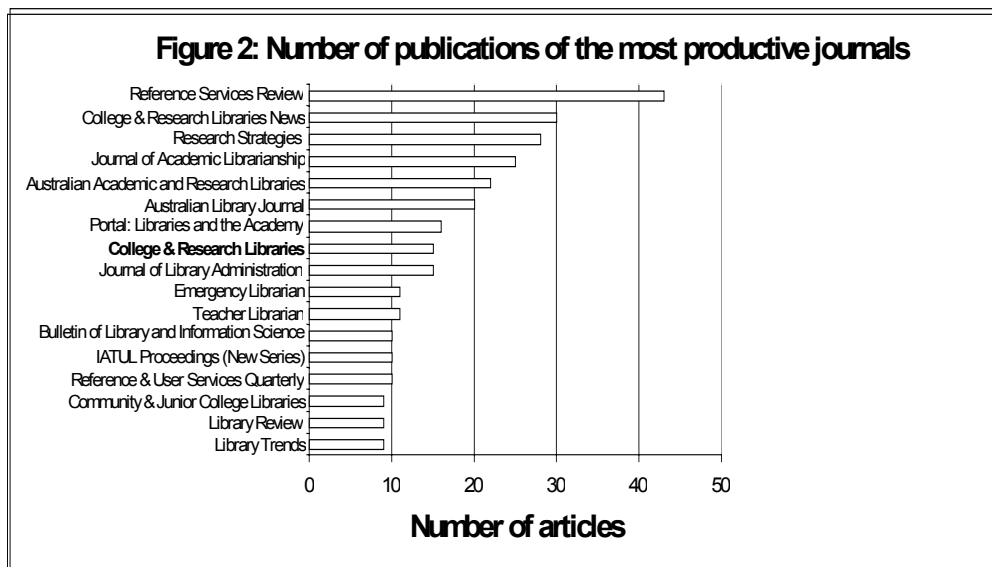
For the time period there was an upward trend in the number of studies carried out on IL. In the 1980s and 1990s there were few studies on IL, whereas the 2000s saw a proliferation of such publications compared with the previous



decades; Figure 1 shows how there is an increasing number of publications over time.

4.2 Out put of Journals

The 607 citations analysed in the present study were published in 158 journals from scientific fields. After applying Bradford's law of scattering with respect to the variable 'journal', three concentric zones were defined. The core or zone 1 contained 199 (32.78% of the total) articles that were published in eight journals. The second zone contain 215 articles (35.42%) published in a total of 32 journals, the number of their respective publication ranging from 4 to 15 articles. Finally, zone 3 consisted of 158 journals publishing one to three articles, accounting for a



total of 193 (31.79%) articles. The most productive journals in terms of IL are shown in more detail in Figure 2.

According to Bradford's law the ratio between three zones should be in the ratio of 1: n: n², while the ratio in each zone of the present is 8:32:118, which is in accordance with the Bradford's distribution. The zone wise distribution of articles on IL in different journals is shown in Table 1.

Table 1: Bradford's distribution of articles over different journals

Zone	Number of Journals	Number of Articles
First	8	199
Second	32	215
Third	118	193
Total	158	607

4.3 Number of Authors

From the analysis it has been observed that out of total 607 articles, 18 did not mention their authors' name. The number of authors contributing to each article ranged from one to eight: however, 63.16% have a sole author while 34.12% have two or three authors. Articles with more than three authors account for 2.71% of the total number of documents. Contribution for each article by number of authors is shown in detail in Table 2.

Table 2: Contribution for each article by number of authors

Sl. No.	Number of Author	Number of Articles	%
1	Single Author	372	63.15
2	Two Authors	161	27.33
3	Three Authors	40	6.79
4	Four Authors	10	1.7
5	Five Authors	1	0.17
6	Six Authors	1	0.17
7	Seven Authors	3	0.51
8	Eight Authors	1	0.17

4.4 Author Productivity

A total of 703 authors contributed to the articles were analysed. Table 3 shows the distribution of the number of articles published by each one of the authors, and reveals that whereas one author contributed as many as 15 articles others only contributed in the range of one to six.

Table 3: Author productivity

No. of Articles	No. of Author	Observed %
1	589	83.78
2	76	10.81
3	19	2.70
4	11	1.56
5	5	0.71
6	2	0.28
15	1	0.14

As can be seen, 83.78% of authors only contributed to one article, those contributing to more than one therefore being much fewer in number. Only one author published fifteen studies.

Lotka's law has been applied to count the author productivity. According to this law the number of scientists who contributed 'n' papers must be $1/n^2$ of those who contribute only one paper. Therefore, the exponent of 'n' is often fixed at 2. Considering the fact that 589 authors have produced only one article each, the value of n can easily be derived. Putting the value of 'n' as 2, the following result (in Table 4)) has been derived.

Table 4: Number of expected authors derived with the value of n=2

No. of Articles	No. of Authors (Observed)	No. of Authors (Expected)
1	589	589
2	76	147
3	19	65
4	11	36
5	5	23
6	2	16
15	1	2

From the analysis it has been observed that, research trends have been changed and inverse square law of scientific productivity in the present study does not match exactly to the Lotka's law.

From the analysis most productive authors have been identified in the field of IL. Table 5 lists 19 most productive authors with their individual contributions.

Table 5: Ranking of most productive authors

Sl. No.	Authors	Rank	No. of Articles
1	Rader, H B	1	15
2	Bereivik, P	2	6
3	Grassian, E	2	6
4	Booker, D	3	5
5	De Jagar, K	3	5
6	Kaplowitz, J R	3	5
7	Nassimberi, M	3	5
8	Xu, Kang	3	5
9	Abel, A	4	4
10	Andretta, S	4	4
11	Bauce, C	4	4
12	Bundy, A	4	4
13	Jacobson, T	4	4
14	Johnson, A M	4	4
15	Julien, H	4	4
16	Manuel, K	4	4
17	Mendrinis, R	4	4
18	Orr, D	4	4
19	Rockman, I F	4	4

4.5 Output with respect to Language

An exhaustive analysis of the articles under study revealed that literature on IL is published in different languages. Table 6 shows the languages in which most articles published on the subject IL.

Table 6: Language-wise distribution of articles

Sl. No.	Language	No. of Articles	%
1	English	536	88.30
2	Chinese	19	3.13
3	German	11	1.81
4	Japanese	10	1.64
5	French	5	0.82
6	Slovenian	5	0.82
7	Turkish	5	0.82
8	Danish	3	0.49
9	Finnish	2	0.32
10	Italian	2	0.32
11	Spanish	2	0.32
12	Afrikaans	1	0.16
13	Catalan	1	0.16
14	Dutch	1	0.16
15	Norwegian	1	0.16
16	Portuguese	1	0.16
17	Russian	1	0.16
18	Swedish	1	0.16

4.6 Global Distribution of Journals

In studying this variable, countries were ranked from greater to lesser productivity on the basis of distribution of articles in the journals published from different countries. Number of articles in the journals with respect to particular country is shown in Table 7. USA a the leading country published 311(51.23% of the total) articles in 58 journals; followed by UK and Germany, with a total of 75 (12.35%) and 51 (8.40%) articles in 38 and 9 journals respectively. Next comes Australia (3.95% in 6 journals), Canada (3.78% in 5 journals) and Japan (2.63% in 5 journals), the remaining 107 (17.62%) documents have been published in 37 journals from 26 countries.

Table7: Global distribution of journals

Sl. No.	Country	No. of Journals	No. of Articles
1	USA	54	311
2	UK	38	75
3	Germany	9	51
4	Australia	6	24
5	Canada	5	23
6	Japan	5	16
7	South Africa	4	12
8	China	3	11
9	France	3	10
10	Spain	3	9
11	Belgium	2	8
12	Denmark	2	7
13	Florida	2	7
14	Netherland	2	5
15	Slovakia	2	4
16	Sweden	2	3
17	Brazil	1	3
18	Comoros	1	3
19	Cuba	1	3
20	Finland	1	3
21	Hungary	1	2
22	Iceland	1	2
23	India	1	2
24	Italy	1	2
25	New Zealand	1	2
26	Nigeria	1	2
27	Ottawa	1	2
28	Russian	1	1
29	Tanzania	1	1
30	Tajikistani	1	1
31	Uganda	1	1
32	Uruguay	1	1
Total		158	607

5 DISCUSSIONS AND CONCLUSION

Throughout this study an analysis of scientific output on the subject of IL has been carried out in terms of frequencies and publications. Taking specific objectives into account the following conclusions can be drawn:

1. Interest in the subject of IL grew considerably during the last quarter of the 20th century, particularly since 1980s and beginning of the 21st century saw a proliferation of such studies;
2. After applying Bradford's law of scattering the 158 journals obtained were distributed into three zones. The core zone contained eight most productive journals publishing 199 articles on the subject IL. According to Bradford's law of scattering this distribution fits $1:n:n^2$, such that the most peripheral zone should contain a greater number of journal titles;
3. The number of authors contributing to each article ranges from one to eight, however, most articles involved collaboration between two or three authors. There is only one paper that contributed by maximum eight authors;
4. Author productivity was not found to exactly fit to Lotka's law with a value of $n=2$, indicating that there a few highly productive authors and a great majority who contribute only occasionally to IL research;
5. The literature on IL was published in 18 languages; however, English was found to be the most favourite language of authors in the subject, publishing 536 (88.30% of the total) articles; and
6. Analysis of the global distribution of journals shows that 32 countries publishing journals that included articles on the subject IL. USA is the leader in the field of IL published 311 articles in 54 journals; followed by UK and Germany with 75 and 51 articles in 38 and 9 journals respectively; the rest 450 articles were published in 57 journals by 29 countries.

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