

Web Citation Analysis of Selected Electronic Journals of Education

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Abstract

The Web has brought many changes and challenges to the field of citation analysis. Scientists now need to make it their job to disseminate their work on as many platforms and in as many different ways as possible, such as publishing in open access and high-impact journals, and posting their work in institutional repositories, personal homepages and e-print servers, if they want their peers to be aware of, use and ultimately cite their work. Publishing a journal article is now only the first step in disseminating or communicating one's work; the Web provides a multitude of methods and tools to publicize its scholarly worth. In this context, this article describes a citation analysis of research articles from selected electronic journals published in 2006-2010. The analysis focused on the extent to which scholars are using web-based sources in scholarly electronic journals. Results of the study shows that 82.20% of articles published in selected 6 electronic journals during 2006-2010 have web references. Out of 7290 references 72.69% of references are print journal references and 27.31% of them are web references. The majority of articles having web references are found in Journal of Distance Education (84.84%) which rank first, followed by Turkish Online Journal of Distance Education (83.96%). Overall, 82.20% of articles include web references. Journal of Distance Education has the majority 33.96% of web references while Journal of E-Learning and Education (85.78%) have the majority of print journal references.

Keywords: Electronic journals; Web based sources; Web references; Citation analysis; Education, URL, Accessibility.

Introduction

The Internet is one of the most important and complex innovations in human history, the largest and most complete tool for information exchange ever made available to the global population.[1] Nowadays, the use of Internet for identifying valuable and timely information has become necessary for most scientists as well as the public with

access to the World Wide Web, since scientific and other work is created and added in digital format on the Internet every day.[2] With the progress of Internet, the full texts of many articles in the scientific journals are presented electronically and in open access form for researchers and hence the Internet has become one the main communicational tools among researchers. E-books, e-journals, e-databases, e-theses and dissertations, e-prints of research papers, and the like have provided a scope for researchers and authors in various subject fields and stimulated their research productivity. Consequently, citations to these Internet resources as novel references have emerged and increased in number. As Zhao and Logan (2002), have indicated, the main reason for such an increase in the

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number of web citations in scholarly papers is that the web has become the first choice for finding information on current research, for breaking scientific discoveries and for keeping up with colleagues at other institutions. On the other hand, there are a lot of open access resources and journals available on the web. This has led authors to refer to more and more web resources as part of their increased research productivity.

Citation Analysis

Citation analysis essentially involves counting the number of times a scientific paper or scientist is cited, and it works on the assumption that influential scientists and important works will be cited more frequently than others. Many governments, funding agencies (in the US at least) and tenure and promotion committees use citation data to evaluate the quality of a researcher's work, partly because they prefer not to rely on peer review and publication output alone. However, not everybody thinks citation analysis is the best way to judge the validity of a scientific claim. Critics point to basic citing errors such as "homographs", i.e., failing to separate citations to two unrelated scientists who happen to share the same last name and first initial. Cronyism, whereby friends or colleagues reciprocally cite each other to mutually build their citation counts, is another drawback. Other problems include people deliberately citing themselves or journals they are involved with; ceremonial citations, in which an author cites an authority in the field without ever having consulted the relevant work itself; and negative citations pointing out incorrect results.

Proponents of citation analysis, on the other hand, claim that these problems are relatively insignificant. Most citations found in articles and books, they say, are useful - by paying homage to pioneers, identifying original publications, providing background reading and alerting readers to forthcoming works.

Citations also substantiate claims, give credit to related works and provide leads to poorly disseminated, poorly indexed or uncited works. According to Michael Koenig in the Palmer School of Library and Information Science at Long Island University in the US, citations provide - despite their ambiguities - "an objective measure of what is variously termed productivity, significance, quality, utility, influence, effectiveness, or impact of scientists and their scholarly products."

The ISI citation databases - which include the Arts and Humanities Citation Index (A&HCI), Science Citation Index (SCI) and Social Sciences Citation Index (SSCI) - have for decades been used as a starting point and often as the only tools for conducting citation analyses. Since their original publication in the 1960s and 1970s these databases have grown dramatically in size and influence, and today contain about 40 million records from more than 8700 of the world's most prestigious research journals. The SCI, which was launched in 1964, quickly became popular with scientists and librarians, and is now one of the most important multidisciplinary databases in the world. Young researchers might find it hard to comprehend, but until 1988 these indexes existed only in print form, although searching them online has been possible since the mid 1970s using third-party information-retrieval systems such as Dialog. In 1988 the ISI supplemented its indexes with CD-ROM editions, and in 1997 the databases finally migrated online with the launch of Web of Science. The move to an online interface, which can analyse thousands of records in a few seconds, has given the ISI's databases an even greater stranglehold in the field of citation analysis. But at the same time the Web has produced new publication venues and competitors that challenge the wisdom of continuing to use Web of Science exclusively.

Another problem with Web of Science is that it ignores the fact that scientists increasingly publish or "post" their papers online via open-access journals, personal homepages, e-print servers or in

institutional repositories so that others can freely access the material. At the same time, researchers have started to search and download research materials via services such as arXiv.org, Google Scholar or publishers' websites, like Elsevier's Science Direct. Many of the millions of documents accessible via these services, which are published instantly to give the wider scientific community time to use and ultimately cite them, are not indexed by Web of Science. Moreover, an increasing number of Web-based services are enabling explicit citation searching.

Related Studies

Harter and Kim's (1996) article entitled "Electronic journals and scholarly communication: a citation and reference study" was one of the first studies on availability and permanency of URLs. The major purpose of their research was to study the effects of scholarly, peer-reviewed e-journals on formal scholarly and scientific communication, as measured by cited references. Accordingly, they extracted and examined 47 unique URLs of 39 scholarly, peer-reviewed e-journals published during 1993 to 1995. They showed that one-third of citations (31%) became inaccessible at the end of 1995.[3] Koehler (1999 and 2002), in a longitudinal study, examined both the accessibility and content of 360 randomly chosen URLs obtained from a web crawler over 3 years. He found that about 50% of them were still active at the end of this time and most had changed in content.[4,5]

Germain (2000) investigated the reliability of URLs in academic citation. 31 randomly chosen academic journal articles, containing 64 citations with URLs, were reviewed. It is worth saying that the academic journals used were from a variety

of disciplines. 13 citations were from information and library science, 10 from the hard sciences, 17 from computer science, 11 from the humanities, and 13 from the social sciences. The printed journals were published between 1995 and 1997. Results of this longitudinal study showed an increasing decline in the availability of URLs. Statistically, after a three-year period, almost 50 percent of the URLs could not be accessed and two-thirds of the journal articles contained corroded citations.[6] The main error message was "Not Found". Davis and Cohen (2001) made a citation analysis of undergraduate term papers in microeconomics and revealed a significant decrease in the frequency of scholarly resources cited between 1996 and 1999. Web citations checked in 2000 revealed that only 55% of URLs cited in 1999 led to the correct Internet document.[7] Davis (2002) in an update to the 1996-1999 citation analysis concluded that 65% of the citations pointed directly to the cited document, up from 55% in 1999.[7]

Dellavalle *et al* (2003) examined systematically the extent of Internet referencing and Internet reference activity in medical or scientific publications in more than 1000 articles published between 2000 and 2003 in three journals: New England Journal of Medicine, Journal of the American Medical Association, and Science. They found that Internet references accounted for 2.6% of all references (672/25548) and in articles 27 months old, 13% of Internet references were inactive with error messages.[8] Casserly and Bird (2003) examined 500 Internet citations randomly chosen from scholarly articles published in library and information science journals. The average number of web citations for each paper was 2.5. They found that only 56.4% of those URLs were permanent, while the rest had disappeared from the original

web address. Moreover, the error message “not available” was the most frequent message found by this study. They found that the most frequent cited URLs belong to the domains “.org” and “.edu.xx”.[9]

Dimitrova and Bugeja (2007) examined the use of web citations, focusing on five leading journals in journalism and communication. They analyzed 1126 URL reference addresses in citations of articles published between 2000 and 2003. The results showed that only 61% of the web citations remained accessible in 2004.[10] The content analysis also demonstrated that “.org” and “.gov” were the most stable domains with 70% active links. Goh & Ng (2007) studied the accessibility and decay of three specialized library and information science journals during 1997-2003. They found that only 69% of those URLs were permanent, while the remaining 31% had disappeared from the original web address. 56% of the error messages were “404” (page not found).[11] The “.edu.xx” with 36% active links were the most stable domains. Wagner et al. (2009) studied the accessibility and decay of health care management journals during 2002-2004. They found that only 50.7% of those URLs were permanent, while the remaining 49.3% had disappeared from the original web address and results in error messages. The “.edu.xx” domain with 68.4% accessibility, appear as the most stable domain.[12]

The above studies clearly show that there is continuous growth in the use of web-based sources in the scholarly journals. However to what extent web-based sources as a whole have been accepted and used as alternatives and/or additions to traditional means in the formal scholarly communications system is still unclear. In this context, the present case study in the field of Education for the years 2006 to 2010, is trying to investigate the extent to which

web-based sources have been used in citations in formal scholarly communications.

Objectives of this Study

The main objectives of the study are:

- To identify the extent of use of web-based sources by scholarly researchers for their research;
- To know the overall impact of web-based sources on formal communication in the field of Education during 2006 to 2010;
- To assess either e-journal articles more likely to cite web based sources than print journal articles or not; and
- To identify which e-journal has more number of web references.

Methodology

The data for this study were drawn from a selective sample of free e-journals available through the Web without subscription or registration. A total six e-journals were selected in the area of Education. All articles published in these six journals during 2006 to 2010 were examined among which all research articles that included reference citations were selected. A total of 472 articles were found out of which 388 article had web references. The references listed for each article were examined and duplicate references in each individual list were removed. Data concerning total number of articles, total number of articles with web references, total number of references, total number of web references and total number of print journal references were recorded. In tables, the number within the parenthesis represents

the percentage. The data collected for the study has been analysed and is presented in the form of tables in the following:

Analysis

Selected E-Journals of the Study

The selected e-journals and their web addresses are listed in Table 1.

Asian Journal of Distance Education

Table 2 illustrates the percentage of articles in 'Asian Journal of Distance Education' having web references during the years 2006 to 2010. Only 62 articles are published in Asian Journal of Distance Education during these years of which 82.25% of articles of web references. All the articles published in the year 2009 and 2010 include web references. Percentage of web references and print journal references are

also presented in Table 2. It is clear from the table that from a total 631 references 40.88% are web references and remaining 59.12 % are print journal references.

E-Learning and Education

Table 3 illustrates the percentage of articles in 'E-Learning and Education' having web references during the years 2006 to 2010. Only 38 articles are published in E-Learning and Education during these years of which 68.42% of articles of web references. All the articles published in the year 2009 and 2010 include web references. Percentage of web references and print journal references are also presented in Table 3. It is clear from the table that from a total 478 references only 14.22% are web references and remaining 85.78 % are print journal references.

Table 1: E-Journals and Their Web Address

Name of the e-journal	Abbreviations	Web address (URL)
Asian Journal of Distance Education	AJDE	http://www.asianjde.org
E-Learning and Education	ELEED	http://eleed.campussource.de
Malaysian Journal of Learning and Instruction	MJLI	http://mjli.uum.edu.my
Turkish Online Journal of Distance Education	TOJDE	http://tojde.anadolu.edu
The Journal of Distance Education	JDE	http://www.jofde.ca
International Journal of Special Education	IJSE	http://www.internationaljournalofspecialeducation.com

Table 2: Percentage of Articles Having Web References in Asian Journal of Distance Education

Year	Total number of articles	Total No. of articles with web references	Total number of references	Total number of web references	Total number of print journal references
2006	12	10 (83.33)	107	42 (39.25)	65 (60.75)
2007	14	9 (64.28)	152	63 (41.44)	89 (58.56)
2008	12	8 (66.66)	94	29 (30.85)	65 (69.15)
2009	11	11 (100)	126	37 (29.36)	89 (70.64)
2010	13	13 (100)	152	87 (57.23)	65 (42.77)
Total	62	51 (82.25)	631	258 (40.88)	373 (59.12)

Table 3: Percentage of Articles Having Web References in E-Learning and Education

Year	Total number of articles	Total No. of articles with web references	Total number of references	Total number of web references	Total number of print journal references
2006	7	2 (28.57)	95	6 (6.31)	89 (93.69)
2007	9	4 (44.44)	123	13 (10.56)	110 (89.44)
2008	7	5 (71.42)	84	10 (11.90)	74 (88.10)
2009	8	8 (100)	98	24 (24.48)	74 (75.52)
2010	7	7 (100)	78	15 (19.23)	63 (80.77)
Total	38	26 (68.42)	478	68 (14.22)	410 (85.78)

Table 4: Percentage of Articles Having Web References in MJLI

Year	Total number of articles	Total No. of articles with web references	Total number of references	Total number of web references	Total number of print journal references
2006	7	5 (71.42)	97	18 (19.56)	79 (80.44)
2007	6	5 (83.33)	94	10 (10.63)	84 (89.37)
2008	10	8 (80.00)	124	21 (16.93)	103 (83.07)
2009	7	7 (100)	105	26 (24.76)	79 (75.24)
2010	7	6 (85.71)	92	32 (34.78)	60 (65.22)
Total	37	31 (83.78)	512	107 (20.89)	405 (79.11)

Table 5: Percentage of Articles Having Web References in TOJDE

Year	Total number of articles	Total No. of articles with web references	Total number of references	Total number of web references	Total number of print journal references
2006	28	22 (78.57)	442	34 (7.69)	408 (92.31)
2007	25	19 (76.00)	328	52 (15.85)	276 (84.15)
2008	25	22 (88.00)	316	48 (15.18)	268 (84.82)
2009	30	28 (93.33)	637	194 (30.45)	443 (69.55)
2010	23	20 (86.95)	306	98 (32.02)	208 (67.98)
Total	131	110 (83.96)	2029	426 (20.99)	1603 (79.01)

Table 6: Percentage of Articles Having Web References in Journal of Distance Education

Year	Total number of articles	Total No. of articles with web references	Total number of references	Total number of web references	Total number of print journal references
2006	20	15 (75.00)	326	143 (43.86)	183 (56.14)
2007	18	16 (88.88)	343	98 (28.57)	245 (71.43)
2008	22	18 (81.81)	512	175 (34.17)	337 (65.83)
2009	21	20 (95.23)	424	152 (35.84)	272 (64.16)
2010	18	15 (83.33)	385	108 (28.05)	277 (71.95)
Total	99	84 (84.84)	1990	676 (33.96)	1314 (66.04)

Malaysian Journal of Learning and Instruction

Table 4 summarises the percentage of articles having web references from the year 2006-2010. Total 37 articles are published in 'Malaysian Journal of Learning and

Instruction' and out of which 83.78% of articles have web references. All the articles published in the year 2009 include web references. Data regarding the percentage of web references and print journal

Table 7: Percentage of Articles Having Web References in IJSE

Year	Total number of articles	Total No. of articles with web references	Total number of references	Total number of web references	Total number of print journal references
2006	21	14 (66.66)	315	43 (13.65)	272 (86.35)
2007	24	15 (62.50)	380	98 (25.78)	282 (74.22)
2008	20	17 (85.00)	323	82 (30.14)	241 (69.86)
2009	18	18 (100.00)	327	98 (29.96)	229 (70.04)
2010	22	22 (100.00)	305	135 (44.26)	170 (55.74)
Total	105	86 (81.90)	1650	456 (27.63)	1194 (72.37)

Table 8: Percentage of Articles Having Web References in Different E-Journals

Name of the E-Journal	Total number of articles	Total No. of articles with web references	Total number of references	Total number of web references	Total number of print journal references
AJDE	62	51 (82.25)	631	258 (40.88)	373 (59.12)
ELEED	38	26 (68.42)	478	68 (14.22)	410 (85.78)
MJLI	37	31 (83.78)	512	107 (20.89)	405 (79.11)
TOJDE	131	110 (83.96)	2029	426 (20.99)	1603 (79.01)
JDE	99	84 (84.84)	1990	676 (33.96)	1314 (66.04)
IJSE	105	86 (81.90)	1650	456 (27.63)	1194 (72.37)
Total	472	388 (82.20)	7290	1991 (27.31)	5299 (72.69)

references shows that 79.11% of references are print journal references and only 20.89% of references are web references.

Turkish Online Journal of Distance Education

Table 5 reveals the percentage of articles in 'Turkish Online Journal of Distance Education' having web references during the years 2006 to 2010. A total of 131 articles are published in Turkish Online Journal of Distance Education during these years of which 83.96% of articles have web references. In the year 2009 more number of web references (93.33%) is found. Table 5 also illustrates the percentage of web references as well as print journal references. It is clear from the table that total 2029 references are found of which 79.01 % are print journal references and only 20.99 % are web references.

Journal of Distance Education

Table 6 clearly shows the percentage of

articles having web references from the year 2006 to 2010. Total 99 articles were published in Journal of Distance Education during these years out of which 84.84% of articles had web references. In 2009, the number of web references was 95.23%. Table also illustrates the percentage of web references and print journal references in the Journal of Distance Education. It is clear from the table that a total of 1990 references are found out of which 33.96 % are web references and only 66.04% of references are print journal references.

International Journal of Special Education

Table 7 clearly shows the percentage of articles having web references from the year 2006 to 2010. Total 105 articles were published in International Journal of Special Education during these years out of which 81.90% of articles had web references. All the articles published in the year 2009 and 2010 include web references. Table also illustrates the percentage of web

references and print journal references in the International Journal of Special Education. It is clear from the table that a total of 1650 references are found out of which 27.63 % are web references and only 72.37% of references are print journal references.

Percentage of Articles Having Web References in Different E-Journals

Percentage of articles having web references in different e-journals and percentage of web references and print references in different e-journals is presented in Table 8. The majority of articles having web references are found in Journal of Distance Education (84.84%) which rank first, followed by Turkish Online Journal of Distance Education (83.96%). Overall, 82.20% of articles include web references. Journal of Distance Education has the majority 33.96% of web references while Journal of E-Learning and Education (85.78%) have the majority of print journal references. The data also clearly indicate that during the years 2006-2010, from all references found in all six e-journals articles 72.69% are print journal references and 27.31% are web references.

Conclusion

The Web has had a huge impact on citation-analysis research. Since the turn of the century, dozens of databases such as Scopus and Google Scholar have appeared which allow the citation patterns of academic papers to be studied with unprecedented speed and ease. This study shows the use of web-based sources in the selected e-journals in the area of Education is almost equal to that of print sources, as measured by web references cited in e-journal articles published in 2006-2010. It is also observed that there is an observable

impact of web-based sources on scholarly electronic journals. Another important observation of the study is that scholars used more print journal references in the scholarly e-journals as compared to web references. Problem for web sources to be accepted and cited is associated with the limitations of web-based sources themselves. The dynamic nature of web-based sources leads to the instability of some of its sources, including content fluidity and changes in technologies used to provide access to web-based sources. Continuing problems and limitations in accessibility of web-based sources is still a serious problem that may affect their acceptability among scholars as legitimate media of formal scholarly communication. Efforts need to be made to identify what factors promote or inhibit using web-based sources in scholarly communication so that we can have a strategic plan for such a transition.

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