

## Google Scholar versions: do more versions of an article mean greater impact?

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### Structured Abstract:

**Purpose** — The growing dominance of Google Scholar (GS) as a first-stop resource for scholars and researchers demands investigation of its influence on citation patterns, freedom of information, and scholarly communication. This study breaks new ground in understanding the various versions GS indexes, correlations between the number of GS versions and citation counts, and the value of Institutional Repositories (IRs) for increasing scholarly impact.

**Design/methodology/approach** — GS listings for 982 articles in several academic subjects from three universities were analyzed for (a) GS version types, including any Institutional Repository versions, (b) citation rates, and (c) availability of free full-text.

**Findings** — (a) Open Access articles were cited more than articles that were not available in free full-text. While journal publisher websites were indexed most often, only a small number of those articles were available as free full-text. (b) There is no correlation between the number of versions of an article and the number of times an article has been cited. (c) Viewing the “versions” of an article may be useful when publisher access is restricted, as over 70% of articles had at least one free full-text version available through an indexed GS version.

**Originality/value** — This paper investigates Google Scholar versions as an alternative source for a scholarly article. While other articles have looked at Google Scholar through various lenses, the authors believe this specific aspect of the topic has not been previously explored.

**Keywords:** Google Scholar, Versions, Institutional repositories, Scholarly publishing, Citations, Digital libraries

**Article Classification:** Research paper

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## Abstract

Purpose — The growing dominance of Google Scholar (GS) as a first-stop resource for scholars and researchers demands investigation of its influence on citation patterns, freedom of information, and scholarly communication. This study breaks new ground in understanding the various versions GS indexes, correlations between the number of GS versions and citation

Design/methodology/approach — GS listings for 982 articles in several academic subjects from three universities were analyzed for (a) GS version types, including any Institutional Repository versions, (b) citation rates, and (c) availability of free full-text.

Findings — (a) Open Access articles were cited more than articles that were not available in free full-text. While journal publisher websites were indexed most often, only a small number of those articles were available as free full-text. (b) There is no correlation between the number of versions of an article and the number of times an article has been cited. (c) Viewing the “versions” of an article may be useful when publisher access is restricted, as over 70% of articles had at least one free full-text version available through an indexed GS version.

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## Introduction

The search engine Google Scholar (GS) has become a popular search tool among academics (Ollé & Borrego, 2010). Not only can researchers use it to find articles on a particular topic,

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2  
3 similar to Web of Science and Scopus, but also GS tracks the citations for individual articles. By  
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5 setting up a GS Citations profile, a collection of a researcher's publications can be listed in one  
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7 place and the researcher can use GS as one of several sources to obtain an h-index. [1]  
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11 When searching in GS for a particular topic, search results include a link through the title of the  
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13 article, most often defaulting to the publisher's version of an article. However, in addition to the  
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15 number of times an item has been cited by other GS content, the search results also provide a  
16  
17 number indicating the how many "versions" of a publication GS has found and indexed (see  
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19 Figure 1). The versions number is linked to a list of the GS versions available for an article (see  
20  
21 Figure 2). Preliminary examination of the versions finds that not only is the publication's initial  
22  
23 linked citation metadata for the article repeated as a version, but additional versions indexing at  
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25 least the article's metadata may also be included. These additional versions may include links to  
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27 full-text versions of the article like the publisher's PDF or author's manuscript or they may be  
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29 basic citations which could include an additional link to the full-text. Metadata provided for a  
30  
31 version's listing often includes the article title, author(s), year published, version source, and the  
32  
33 beginning of the abstract. All of these versions are aggregated under the article's main citation  
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35 in GS.  
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43 [INSERT FIGURE 1]  
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46 [INSERT FIGURE 2]  
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49 The purpose of this paper is to conduct a preliminary study into GS versions to develop a better  
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51 understanding of the various sources being indexed by GS. In addition, this study will examine  
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53 if there are any correlations between the number of GS versions of an article, type of version  
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55 found, and the number of times it was cited.  
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## Background

The authors' interests in conducting this study included:

1. defining version types,
2. determining if there is a correlation between the number of GS versions and their scholarly impact (times cited), and
3. determining if there is a correlation between full-text articles retrieved in GS, including those found in the IR, and their scholarly impact (times cited).

Many academic institutions have employed Institutional Repositories. IRs offer a place where either the final peer reviewed manuscript (post-print) or publisher PDF can be made publicly accessible depending on the archiving policies of the journal and/or the copyright retained by author. As a result, if a researcher cannot gain access to an article through the publisher, another avenue may be provided through the IR, which typically makes these articles openly accessible. Making an article available in an IR is under local control, meaning the individual author and/or institution took action to make it accessible. Many IRs are set up to be captured by GS (Norris et al, 2008a), although Dublin Core has presented indexing challenges to GS (Arlitsch & O'Brien, 2011). When repositories are configured for Google indexing optimization, a GS version of an article is also created. An additional interest held by the authors included determining whether institutions that self archive and thus create an additional "version" of an item in GS are more likely to see greater citation numbers than articles that are not self-archived through the IR, particularly in the cases when the article is open access.

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3 The research examining the impact of open access is varied. For example, a 2004 study  
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5 examining articles in philosophy, political science, electrical and electronic engineering, and  
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7 mathematics found that the openly accessible articles were cited more than articles not openly  
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9 accessible (Antelman, 2004). Norris et al (2008b) also found articles that were available in an  
10  
11 open access format were cited more than articles from the same journals not openly accessible.  
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13 A study of the journal *PNAS* found that open access articles published in the journal were cited  
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15 more than the non-open access articles in the first 10 to 16 months from when they were  
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17 published (Eysenback, 2006). However, an article by Craig et al. argues that many of the studies  
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19 examining the impact of open access articles versus non-open access articles did not take into  
20  
21 account many of the confounding variables, suggesting that it was not possible to definitively  
22  
23 conclude that making articles openly accessible alone is responsible for the increased citation  
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25 rates of the open access articles (2007). Craig et al. pointed out possible confounding variables  
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27 such as the open access versions of articles being posted sooner than the publisher version was  
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29 made available, meaning that once the time articles became available was controlled for, open-  
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31 access had no citation advantage. Selection bias was another confounding variable, where by the  
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33 quality of the article was used to decide if an article would be made openly accessible, and thus it  
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35 was the quality of the article and not the openness that led to the higher citations.  
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## 44 **Methodology**

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47 In order to examine the IR versions that appear in GS and any potential correlation they may  
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49 have with scholarly impact, it was necessary to identify a set of scholarly articles to study and a  
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51 subset of articles that could be found in IRs. In order to obtain a controlled set of articles to  
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53 study where some variability in the data could be controlled if specific subject areas were  
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55 studied, it was determined that one way to do this would be select institutions with IRs and  
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3 examine collections within these repositories that had subject collections containing 50 or more  
4 articles. In order to ensure that a large enough subset of articles could be obtained from an  
5 institution in a particular subject area, it was necessary to examine the repository of several  
6 intuitions to determine which met this criterion. The listing for North America on the Ranking  
7 Web of Repositories was consulted to determine the ten universities with the highest-ranked IRs  
8 (Cybermetrics Lab, 2013). These IRs were examined to identify those that contained large sets  
9 of faculty publications (50 or more) in specific subject areas, with the intent of finding two or  
10 more institutions with 50 or more articles in the same subject areas of their repositories. This  
11 criterion was used so the impact of repositories could be examined over similar subject areas at  
12 the different institutions.  
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28 Two U.S. academic institutions (institution A & B) with repositories meeting the above criteria  
29 were identified and several subject areas were chosen based on the number of faculty  
30 publications found within subject areas of the repositories. In addition, one repository from a  
31 U.S. academic institution (institution C) with less than 15 articles per subject areas was selected  
32 as a comparison to the other two repositories. All repositories selected had subject collections in  
33 psychology, chemistry, electrical engineering, and earth sciences, although the schools may have  
34 had differing names for these disciplines.  
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45 Once the schools and the subject areas were identified, searches by author affiliation and college  
46 in the chosen subject areas were performed in Web of Science (WOS) to find all articles written  
47 by researchers from each of the colleges/subject areas within the time span of 2006 to 2011. To  
48 find 50 articles indexed in WOS and also located in the corresponding IR, a random number  
49 generator was used to randomly select articles from the IR. If the article from the IR was also  
50 indexed in WOS, it was included in the study. This was repeated until 50 IR articles were  
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3 identified or there were no more articles in the IR to include for a particular institution and  
4 subject area. Fifty articles were then randomly selected from the remaining articles retrieved  
5 from WOS for each institution/subject area. These articles were not excluded if they were also  
6 found to be in the repository. For institution C, 50 IR articles were not identified, but searches  
7 were conducted in Institution C's IR for the 50 articles randomly selected from Web of Science  
8 to ensure they were not in Institution C's IR. Any articles found to be in the IR were dropped  
9 from the study and a new article was randomly selected from the possible pool of articles.  
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20 The authors then selected ten articles from each of the created lists and searched for them in GS.  
21 The purpose of this was to create a list of web sources that appeared as one of the "versions" in  
22 GS (see Appendix 1). This list was included in an online submission form used to record details  
23 about the identified study articles shown in Figure 3. The online form that was developed  
24 prompted for institution of author (Institution A, B, or C), subject area (chemistry, earth sciences,  
25 electrical engineering, psychology), IR status, how many times the article had been cited, the  
26 number of versions indicated by GS, and a list of pre-identified GS versions. For the list of GS  
27 versions (web sources), the following information was requested for each article where a version  
28 was identified: the originating source of the version (e.g. publisher, PubMed, Mendeley, etc.),  
29 format of the article (free full-text [publisher PDF or author's manuscript], or citation only) and  
30 the number of times a version appeared for a particular article. The data was collected off-  
31 campus so the researchers would not have access to content through campus subscriptions. This  
32 permitted the researchers to determine where either full-text access to an article was freely  
33 available or a subscription or membership was required. Thus, when an article was identified as  
34 citation only during data collection, it was either because only the citation to the article was  
35 available or access to the full-text was only available through a log-in and therefore the full-text  
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3 was not freely accessible. For any GS version not identified through testing prior to the data  
4 collection, blank fields were provided on the online submission form to capture these additional  
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8 versions.

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11 [INSERT FIGURE 3]  
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## 14 **Results**

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18 A total of 982 articles were examined. Only 37 IR articles were identified in the Electrical  
19 Engineering category for Institution B, only 48 IR articles were identified in the Psychology  
20 category for Institution A, and only 47 articles were identified in the Geological Studies category  
21 for Institution A.  
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28 One of the main purposes of this study was to determine if there was a correlation between the  
29 number of times an article is cited and the number of GS versions that appear for an article.  
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32 Results of the analysis indicate there is no correlation ( $r = 0.257$ ,  $n = 982$ ,  $p = 0.000$ ). One  
33 article was found to have 56 GS versions, but the majority of articles (56%) were found to have  
34 between four and nine GS versions. Thirty articles identified for the study were not found in GS  
35 and nine articles were found to have only one GS version.  
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43 The frequency by which articles were indexed by the various GS versions is presented in Table  
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45 1. Journal publisher websites were the most likely version where an article would be indexed  
46 with 864 (87.8%) of the total 982 articles examined having a publisher version. The majority of  
47 the journal publisher websites only provided access to the citation and abstract of an article  
48 (85.7%), although 14.3% of the articles examined were openly available as full-text through the  
49 journal publisher website. The next most commonly found versions of articles were Refdoc  
50 (n=618, 62.9%), PubMed (n=458, 45.9%), and unlinked citations (citations that only appear as  
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3 part of the list presented by GS with no link to a website) (n=422, 43%). Both Refdoc and  
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5 PubMed may have linked to available full-text, but do not themselves archive the full-text. IRs  
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7 were the next most likely GS version (n=409, 41.6%). The primary format of the IR version  
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9 was the publisher PDF or a version formatted to be similar to the publisher PDF (88%). Six  
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11 percent of the articles found in the IR were the author's manuscript, and 6% were only a citation  
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13 to the article where most likely a login would have resulted in access to the full-text.  
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18 [INSERT TABLE 1]  
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21 Some articles had duplicate versions appear. For example, selecting the versions in GS may  
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23 have linked to an IR page showing a citation for an article and also to an IR page with the full-  
24  
25 text. Unlinked citations and IRs often had duplicate (or more) versions appear for an article.  
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27 Departmental print servers were the most likely version type to have duplicate publisher PDFs or  
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29 author's manuscripts appear for an article. Sixty articles had duplicate versions appear, 152 had  
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31 three or more versions appear, and within that, eight had ten or more with one having as many as  
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33 17 versions appear. Many of these versions all had the same base URL (i.e., schoolname.edu)  
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35 but were held in various directories of a similar server (i.e., engineering.schoolname.edu,  
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37 geography.schoolname.edu). It is unknown if these were multiple postings or aliases for the  
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39 same server. Google Scholar counted them as separate versions. 448 free full-text articles were  
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41 provided through two or more GS versions.  
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49 To determine if there was a particular version that may be related to a higher number of citations  
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51 per article, the average number of citations by GS versions were examined. While there were GS  
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53 versions with a greater mean number of citations than other versions, most articles were not  
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55 indexed within the versions noted to have the higher mean number of citations (see Table 1).  
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3 The versions that had the largest mean number of citations per article were association websites  
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5 ( $x = 74.63$ , .8%), Citeulike ( $x = 59.92$ , 2.4%), APA PsychNet ( $x = 56.04$ , 8.5%), CHERIC  
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7 ( $x = 51.94$ , 1.8%), and CiteSeerX ( $x = 47.41$ , 3.5%).  
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11 Further analysis was done to determine if a combination of versions resulted in a higher mean  
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13 number of citations per article. Using the conditions of the top four versions where articles were  
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15 often found to be indexed (IR, publisher website, RefDoc, Pubmed ) and the full-text status of  
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17 the articles, the various combinations of none, three, four or all five conditions present were  
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19 calculated (see Table 2). Articles meeting none of these conditions had a mean of 4.18 citations  
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21 per article, while articles meeting all five conditions had a mean of 34.96. Articles found in  
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23 Refdoc, PubMed, and had a full-text version available had the highest mean number of citations  
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25 per article ( $x = 36.48$ ).  
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31 [INSERT TABLE 2]  
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35 Of the 982 articles examined, 690 (70%) had at least one free full-text version available through  
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37 a GS version (publisher PDF or author's manuscript). Institutional repositories, PMC, and  
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39 departmental IRs were the GS versions most likely to provide access to a free full-text version of  
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41 an article. Institutions A and B, which included articles in their IRs, had 72% and 75%  
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43 respectively of articles with at least one free full-text version available through GS.  
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47 Alternatively, Institution C, which did not include the examination of a set of articles in its own  
48  
49 IR, had 58% of articles with at least one free full-text version through GS. Of the 409 articles  
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51 found to be in the IRs of the institutions studied, 97% were available in a free full-text format.  
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53  
54 Of the 573 articles not in the IRs of the Institutions studied, 51% were found to be available in a  
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56 free full-text format. Of the 690 free full-text articles, 67% were found in an IR.  
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3 The number of times articles were cited where the full-text was freely available (publisher PDF  
4 or author's manuscript) was compared to the number of times articles were cited where only the  
5 citation was freely available. Articles with free full-text were cited significantly more  
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7  
8 (M=28.41, SD=44.61) than articles where only the citations were viewable (M=17.89,  
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11 SD=35.08;  $t(980)=3.586$ ,  $p=0.000$ ) (see Table 3). At an institutional level, both Institutions B  
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13 and C also showed a similar pattern where articles with a free full-text version available were  
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15 significantly cited more than articles with no free full-text version.  
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21 [INSERT TABLE 3]  
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24 The mean citations per article by subject were as follows: chemistry  $\bar{x}=28.10$  (63% of articles  
25 available full-text), electrical engineering  $\bar{x}=19.88$  (66% of articles available full-text), earth  
26  
27 sciences  $\bar{x}=22.8$  (71% of articles available full-text), and psychology  $\bar{x}=30.08$  (81% of  
28  
29 articles available full-text). Google Scholar versions by subject were also examined (see Table  
30  
31 4). Chemistry and psychology articles were more likely to be indexed in PubMed and PubMed  
32  
33 Central than the other subjects. Psychology articles were more likely to be found in APA  
34  
35 PsychNet, and electrical engineering articles were more likely to be found in AMC Digital  
36  
37 Library than other subjects. Both electrical engineering and chemistry articles were more likely  
38  
39 to be indexed in SAO/NASA Ads Physics Abstract Services and on departmental websites or  
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41 print servers.  
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48 [INSERT TABLE 4]  
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## 51 Discussion

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55 In this study, the versions of an article in GS were examined to determine whether institutions  
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57 that self-archive are more likely to see greater citation numbers than for articles at institutions  
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3 that do not self-archive. Institutional repositories, PubMed Central, department websites, and  
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5 ResearchGate played an important role in the availability of free full-text articles. In addition,  
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7 articles available in an open access format were more likely to be cited than non-open access  
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9 articles. With 70% of the articles having at least one free full-text version available, selecting the  
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11 versions link within GS is a useful resource for researchers who do not have subscription access  
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13 to a journal article and are in need of the full-text.  
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18 The results found no correlation between the number of versions of an article in GS and citation  
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20 rates. However, while the number of versions of an article does not appear to matter, the source  
21  
22 of the version does appear to have an impact. When articles did not have GS versions from  
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24 PubMed, the publisher website, Refdocs, or an IR, nor did they have a free full-text version, they  
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26 had a low citation rate. Articles with a free full-text version and that were indexed in Refdoc  
27  
28 and PubMed; articles with a free full-text version and that were indexed on the publisher website,  
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30 RefDoc and PubMed; and articles indexed in the IR, the publisher website, RefDoc and PubMed  
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32 were all found to have higher citation rates. Within these versions, the author would only have  
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34 control over whether the article was accessible through an IR. Perhaps more accurately, authors  
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36 do not have control over whether their article appears on the publisher website, Refdoc, and  
37  
38 PubMed because these depend upon the availability scenarios set by the journal publisher. The  
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40 results of this study suggest there is a benefit to depositing articles in the IR over and above the  
41  
42 benefits of having an article indexed in other versions captured by GS, and thus researchers  
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44 likely have nothing to lose by making an article freely accessible through their Institutional  
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46 Repository, whenever possible.  
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55 The GS versions that had the largest mean number of citations per article were association  
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57 websites, Citeulike, APA PSycNet, CHERIC, and CiteSeerX. However, only a small percentage  
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3 of articles were indexed in these sources and it's also unclear what characteristics of these  
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5 sources may lead to a higher mean. In the case of Citeulike, because citations appear as a result  
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7 of social bookmarking by the researchers who use the service, it is possible it was the importance  
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9 of the article that led a researcher to include it in Citeulike, and thus its high mean and its  
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11 inclusion in Citeulike is a reflection of the importance and impact of the article, and not the fact  
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13 that it was in Citeulike that led it to be found and cited more.  
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18 There is a rising interest in using social bookmarking and altmetrics to measure the impact of  
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20 scholarship [2]. Seeing the overall low appearance of social media websites such as Mendeley  
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22 and Citeulike appearing as a version for the articles included in this study likely points to the  
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24 uniqueness of inclusion in these tools. If the majority of articles were found to be included in  
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26 social media tools used to measure impact (altmetrics), then inclusion would not be seen as  
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28 unique, and thus there would be nothing outstanding in the fact that a human made the choice to  
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30 bookmark an article. However, as the appearances of social bookmarking tools were limited, it  
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32 is difficult to state anything conclusively.  
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### 38 **Limitations and Further Research**

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41 This study does not examine cause and effect, but instead notes the correlations between  
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43 different relationships. While the findings suggest that full-text articles are cited more, this  
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45 study does not account for the date on which the full-text items may have posted or other  
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47 variables that may impact the use of publications. Perhaps the free full-text versions of articles  
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49 were posted prior to the official publication date of the articles, leading to their greater impact.  
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51 A possible argument against this idea is that in many cases it was the publisher PDF made  
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53 available, so the availability of that version in a free format would likely have come closer to the  
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3 release of the actual publication or later. Another issue that may compound the impact of free  
4 full-text on the citations is the possibility of selection bias noted by Craig et al. It is unknown  
5 what motivated authors or others to make articles freely accessible.  
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11 In this study, the selection and review of IRs was based on criteria that the selected IRs have at  
12 least a minimum required number of articles deposited. This controlled group of selected articles  
13 may not be representative of the full-text availability of institutions with no IR. Even if an  
14 institution's IR is not heavily used, perhaps messages to faculty about self-archiving their  
15 publications in an IR could influence their behavior in terms of being more likely to make their  
16 research accessible in some format. Thus, studies on less controlled sets of publications found in  
17 GS could yield very different results in terms of the number of articles openly accessible.  
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28 Studies on this in different subject areas could also yield different results.  
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31 This study only looked at free full-text access and versions of articles or their metadata as  
32 available through GS. Other search engines, such as Google or Yahoo, may link to other  
33 versions of articles (either full-text or the metadata) not captured through GS.  
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## 38 39 **Conclusions**

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42 While it was possible to define the GS version types found by the authors, and the correlations  
43 between the impact of the articles and both GS indexed IR versions and GS versions did not  
44 exist, the results of this study suggest there is possibly a benefit to archiving articles in the IR  
45 over and above the benefits of having an article indexed in other versions captured by GS.  
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50 Versions of articles included as part of GS's results do provide access to many articles that at  
51 first glance appear to be locked behind the publishers' pay walls when trying to access scholarly  
52 articles without the benefit of a subscription to the journals. When researchers find that they  
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9 author's manuscript or the publisher PDF itself.  
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## 14 15 Notes

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18 1. h-index: an attempt to measure the productivity and cumulative impact of a researcher's  
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20 published work by looking at the distribution of citations the work has received.  
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- 23 2. Altmetrics measures the impact of scholarship, beyond just citations, by examining  
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25 article metrics in Web 2.0 social media tools such as Twitter, Facebook, CiteULike,  
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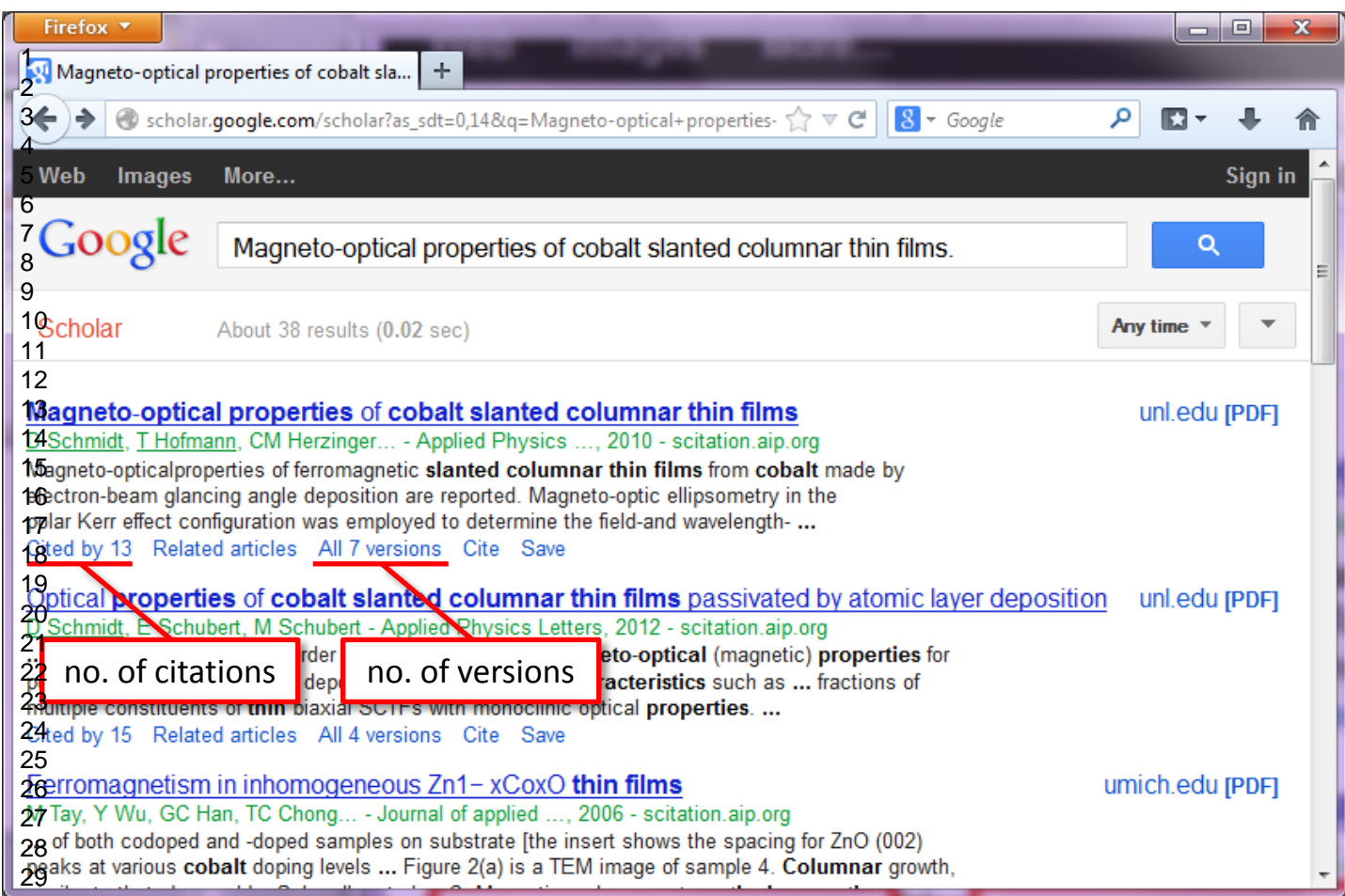
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25 [INSERT APPENDIX 1]  
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Figure 1. Google Scholar search results showing number of citations and versions



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14 [Magneto-optical properties of cobalt slanted columnar thin films](#)

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18 polar Kerr effect configuration was employed to determine the field-and wavelength- ...  
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20 [Magneto-optical properties of cobalt slanted columnar thin films](#) researchgate.net [PDF]

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34 Schmidt, T Hofmann, CM Herzinger, E Schubert... - 2010 - digitalcommons.unl.edu

35 Abstract Magneto-optical properties of ferromagnetic slanted columnar thin films from cobalt  
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40 [Magneto-optical properties of cobalt slanted columnar thin films](#)

41 SCHMIDT, T HOFMANN, CM HERZINGER... - Applied physics ..., 2010 - cat.inist.fr

42 RefDoc Refdoc est un service / is powered by. ...  
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45 [Magneto-optical properties of cobalt slanted columnar thin films](#)

46 Schmidt, T Hofmann, CM Herzinger... - Applied Physics ..., 2010 - adsabs.harvard.edu

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51 [Magneto-optical properties of cobalt slanted columnar thin films](#) tsinghua.edu.cn [PDF]

52 Schmidt, T Hofmann, CM Herzinger... - APPLIED PHYSICS ..., 2010 - wr.lib.tsinghua.edu.cn

53 Magneto-optical properties of ferromagnetic slanted columnar thin films from cobalt made by  
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Article #

Institution

- University A
- University B
- University C

Subject

- Chemistry
- Electrical Engineering
- Geological Sciences
- Psychology

Article in IR (per initial list)

- Yes (IR list)
- No (WOS list)

How many times has the article been cited in GS?

How many GS Versions

GS Versions

	Google Scholar Versions	free full text available			Number of times version show in GS	
	Yes	Journal publisher	Postprint (author manuscript)	citation only	# of times	Notes
Institutional IR	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Journal Publisher Website	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Institutional Repository (other than an IR where the author(s) is affiliated)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
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Table 1. GS versions - frequency, means, and full-text availability

GS Version	Frequency of GS Versions	# of Times GS Version Appeared	Mean # Citations	Total # Citations	% articles in version	Primary Formats for the GS Versions (Full-text Availability)
Journal Publisher Website	862	1385	25.92	22345	87.8%	
Journal Publisher Website-citation only	737	1155	24.27	17888	75.1%	Citation-85.7%
Journal Publisher Website-Journal publisher (PDF)	125	230	35.66	4457	12.7%	PubPDF-14.3%
Refdoc	618	631	27.83	17202	62.9%	Citation-100%
PubMed	451	458	32.72	14758	45.9%	Citation-100%
Unlinked Citations	422	997	29.69	12530	43.0%	Citation-100%
Institutional IR	409	742	26.50	10838	41.6%	
Institutional IR-Postprint (author's manuscript or PDF)	372	690	27.10	10082	37.9%	PubPDF or Author Man -94%
Institutional IR-citation only	26	52	17.58	457	2.6%	Citation-6%
Europe PMC	303	406	34.18	10358	30.9%	PubPDF or Author Man -73%, Citation-27%
SAO/NASA ADS Physics Abstract Services	323	348	22.29	7199	32.9%	PubPDF-3%, Citation-97%
Department Website at Institution	314	990	30.80	9672	32.0%	PubPDF or Author Man - 98%, Citation-2%
PMC (PubMed Central)	162	179	29.65	4803	16.5%	PubPDF-25%, Author Man-75%
ResearchGate	107	112	30.82	3298	10.9%	PubPDF or Author Man -99%, Citation-1%
Translation (from English)	87	94	29.22	2542	8.9%	Citation-98%
APA PsychNet	83	100	56.04	4651	8.5%	Citation-100%
IR (other than study institution)	81	155	30.73	2489	8.2%	PubPDF or Author Man -42%, Citation-58%
ERIC	57	57	26.12	1489	5.8%	Citation-100%
IngentaConnect	51	51	22.84	1165	5.2%	Citation-96%
AMC Digital Library	44	46	29.02	1277	4.5%	Citation-100%
CiteSeerX	34	50	47.41	1612	3.5%	PubPDF or Author Man -100%
IEEEExplore Digital Library	35	38	21.14	740	3.6%	Citation-100%
JSTOR	30	29	38.30	1149	3.1%	PubPDF or Author Man -100%
Frontiers	26	27	38.00	988	2.6%	Citation-100%
Citeulike	24	29	59.92	1438	2.4%	Citation-100%

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Author Website	24	44	32.33	776	2.4%	PubPDF or Author Man - 96%, Citation-4%
CHERIC	18	20	51.94	935	1.8%	Citation-100%
Energy Citations Database	18	19	36.83	663	1.8%	Citation-100%
Cabdirect	16	15	16.25	260	1.6%	Citation-100%
Scitation	12	13	19.67	236	1.2%	N/A - Content no longer accessible
Hyper Articles en Ligne	10	18	13.70	137	1.0%	PubPDF or Author Man -17%, Citation-83%
ProQuest-CSA	9	10	27.11	244	.9%	Citation-100%
arXiv	8	9	20.00	160	.8%	Author Man-100%
Association Website	8	27	74.63	597	.8%	PubPDF-100%
CERN documents server	3	4	26.00	78	.3%	Citation-100%
DTIC Online Information for the defense community	3	3	20.00	60	.3%	PubPDF or Author Man -33%, Citation-67%
Storming Media	3	3	21.33	64	.3%	Citation-100%
Get Cited	2	7	8.50	17	.2%	Citation-100%
Directory of Open Access Journals (DOPEN ACCESSJ)	2	2	5.00	10	.2%	PubPDF-100%
ETDEWEB	2	2	19.50	39	.2%	PubPDF-100%
Google Books	2	2	21.50	43	.2%	PubPDF-100%
HAL-UPMC	2	3	32.00	64	.2%	PubPDF-50%, Author Man-50%
Mendeley	1	1	8.00	8	.1%	Citation-100%
RERO	1	1	244.00	244	.1%	Citation-100%

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Table 2. Means of version combinations

GS Version					Full-text	Mean	N	Std. Dev	% articles
IR	Publisher	RefDoc	PubMed						
no	no	x	x	x	36.48	257	58.687	26%	
no	x	x	x	x	35.84	231	55.217	24%	
x	x	x	x	x	34.96	140	40.683	14%	
x	x	x	x	no	34.84	142	40.408	14%	
no	x	no	x	x	34.35	321	51.777	33%	
x	no	x	x	no	33.80	154	39.134	16%	
x	x	no	x	no	32.32	194	36.997	20%	
no	x	x	no	x	29.91	400	46.525	41%	
x	x	x	no	x	29.64	234	37.123	24%	
x	x	x	no	no	29.33	240	36.738	24%	
x	no	x	no	x	28.82	253	35.983	26%	
x	x	no	no	x	27.52	370	34.428	4%	
no	no	no	no	no	4.18	39	9.992	4%	

X=version present



Table 3. Article citations by type

Year / Institution	All		Free Full-text		Citation only	
	Mean	N	Mean	N (%)	Mean	N (%)
<b>2005</b>	37.90	21	53.56	9 (43)	26.17	12 (57)
<b>2006*</b>	32.23	177	34.58	139 (78.5)	23.63	38 (21.5)
<b>2007</b>	37.16	190	40.03	135 (71)	30.13	55 (29)
<b>2008*</b>	23.72	158	28.77	111 (70)	11.81	47 (30)
<b>2009</b>	21.23	172	21.42	128 (74)	20.66	44 (26)
<b>2010*</b>	16.98	157	21.66	98 (62)	9.20	59 (38)
<b>2011*</b>	10.18	104	12.04	68 (65)	6.67	36 (35)
<b>Institution A</b>	26.64	395	27.97	285 (72)	23.18	110 (28)
<b>Institution B*</b>	25.07	387	28.75	289 (75)	14.21	98 (25)
<b>Institution C*</b>	23.03	200	28.66	116 (58)	15.26	84 (42)
<b>Total*</b>	25.28	982	<b>28.41</b>	<b>690</b>	<b>17.89</b>	<b>292</b>

\*Statistically Significant - Full-text articles cited significantly more than Citation Only ( $p < 0.05$ )

Table 4. Version availability by subject

	<b>Chemistry</b>	<b>Electrical Engineering</b>	<b>Geological Sciences</b>	<b>Psychology</b>
	Number of times in GS version (% within version by Subject)			
Institutional IR	90 (22%)	91 (22%)	111 (27%)	117 (29%)
Journal Publisher Website	222 (26%)	204 (24%)	224 (26%)	212 (25%)
IR (Other)	5 (5%)	20 (25%)	51 (63%)	6 (7%)
PubMed	171 (38%)	63 (14%)	32 (7%)	185 (41%)
PubMedCentral (PMC)	63 (39%)	24 (15%)	8 (5%)	67 (41%)
Europe PMC	121 (40%)	33 (11%)	16 (5%)	133 (44%)
arXiv	0 (0%)	8 (100%)	0 (0%)	0 (0%)
APA PsychNet	1 (1%)	0 (0%)	0 (0%)	82 (99%)
Citeulike	6 (25%)	6 (25%)	6 (25%)	6 (25%)
Refdoc	175 (28%)	154 (25%)	124 (20%)	165 (27%)
Translation (from English)	13 (15%)	28 (32%)	40 (46%)	6 (7%)
Unlinked Citations	100 (24%)	101 (24%)	127 (30%)	94 (22%)
Author Website	3 (13%)	3 (13%)	4 (17%)	14 (58%)
Association Website	1 (13%)	0 (0%)	0 (0%)	7 (88%)
AMC Digital Library	1 (2%)	43 (98%)	0 (0%)	0 (0%)
Cabdirect	2 (13%)	0 (0%)	12 (75%)	2 (13%)
CHERIC	18 (100%)	0 (0%)	0 (0%)	0 (0%)
CiteSeerX	3 (9%)	25 (74%)	3 (9%)	3 (9%)
Energy Citations Database	9 (50%)	8 (44%)	1 (6%)	0 (0%)
ERIC	3 (5%)	0 (0%)	0 (0%)	54 (95%)
Frontiers	3 (12%)	0 (0%)	0 (0%)	23 (88%)
IngentaConnect	6 (12%)	2 (4%)	12 (24%)	31 (61%)
JSTOR	4 (13%)	1 (3%)	19 (63%)	6 (20%)
SAO/NASA ADS Physics	51 (16%)	122 (38%)	146 (45%)	4 (1%)
IEEEExplore Digital Library	5 (14%)	30 (86%)	0 (0%)	0 (0%)
ProQuest-CSA	9 (100%)	0 (0%)	0 (0%)	0 (0%)
ResearchGate	11 (10%)	27 (25%)	37 (35%)	32 (30%)
Scitation	1 (8%)	11 (92%)	0 (0%)	0 (0%)
Hyper Articles en Ligne	2 (20%)	2 (20%)	5 (50%)	1 (10%)
Department Website at Institution	35 (11%)	113 (36%)	105 (33%)	61 (19%)

## Appendix. Google Scholar version descriptions

<b>GS Version</b>	<b>Description</b>
ACM Digital Library acm.org	An online resource that provides full-text of every article published by the Association for Computer Machinery.
APA PsycNET psychnet.apa.org	An online database that delivers content of the American Psychological Association. Access is available to subscription.
arXiv arxiv.org	An online digital archive and distribution server of scientific paper preprints that is owned and operated by Cornell University and funded by the Cornell University Library, the Simons Foundation and member institutions. Registered authors submit their articles directly to arXiv.
Association Website	An online site for an organization established around a common interest.
Author Website	An online location created by the author that, among other uses, lists information about the author's academic work. This may also include a web page or site created by the author that is hosted by their institution but is not part of their college or department section.
Cabdirect cabdirect.org	An online access point for health sciences abstracts from CABI, a not-for-profit organization that provides information and applies scientific expertise to solve problems in agriculture and the environment. Searches the CABI databases CAB Abstracts, Global Health, Internet Resources and Abstract Journals.
CERN Document Server cds.cern.ch	An online service of the European Organization for Nuclear Research that provides bibliographic records and full-text documents covering the topic of high-energy physics. The Articles & Preprints collection, comprehensively indexed by the CERN Scientific Information Service, includes articles published in journals, preprints, technical reports, conference presentations, scientific committee documents and theses.
CHERIC cheric.org	An online database from the Chemical Engineering Research Information Center provided by Korea University in Seoul.
CiteSeerX citeseerx.ist.psu.edu	An online digital library of scientific information focused primarily on the literature in computer and information science. Research papers are automatically harvested from the public Web. CiteSeerX also accepts author's submissions.
CiteULike citeulike.org	A free online social bookmark manager for finding and managing scholarly references. CitULike is independently owned and collection citations selected by the researchers who use the service.
Directory of Open Access Journals doaj.org/	An online resource that promotes the use of quality controlled open access journals. Editors from open access journals are invited to register with and be vetted by DOAJ before their articles will be included,
DTIC Online dtic.mil	An online open access resource from the Defense Technical Information Center that provides information about scientific, technical, engineering, and business-related topics. Formerly the Department of Defense Research and Engineering Portal.
Energy Citations Database osti.gov	An online digital library of bibliographic data for historical and current research (1948 to the present) from the U.S. Department of Energy and its predecessor agencies.
ERIC eric.ed.gov	An online digital library of education research and information sponsored by the Institute of Education Sciences (IES) of the U.S. Department of Education. ERIC provides an index to Institute of Education Sciences (IES) publications, the full-text of What Works Clearinghouse supporting documents, and other materials selected from the U.S. Department of Education.

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3	ETDEWEB	The Energy Technology Data Exchange World Energy Base provides online
4	etde.org/etdeweb	access to literature references and full-text documents not typically available
5		through other sources. Organizations in the member countries of the Energy
6		Technology Data Exchange (ETDE), an international agreement under the
7		International Energy Agency (IEA), input information into the database.
8	Europe PubMed Central	A European version of PubMed Central, which predominantly offers full-text
9	europepmc.org	scientific literature in biomedical and life sciences subjects presented by the
10		European Bioinformatics Institute at the European Molecular Biology
11		Laboratory (EMBL-EBI). Not an exact mirror of PubMed Central as different
12		sources may be offered in addition to what is in the US PMC. Publishers who
13		have an agreement with EMBL-EBI deposit full-text articles in the database.
14	Frontiers	An online publisher of open access, peer reviewed scientific scholarly journals.
15	frontiersin.org	
16	getCITED	An online academic database, directory, and discussion forum driven by
17	getcited.org	members who enter and edit the content.
18	Google Books	An online search engine that contains full-text books with expired copyrights
19		or where the publisher has provided permission for use.
20	HAL-UPMC	An IR from the Pierre & Marie Curie University in France dedicated to the
21	hal.upmc.fr	deposit of and open access to scientific publications.
22	Hyper Articles en Ligne	An online multi-disciplinary open access archive for the deposit and
23	hal.archives-ouvertes.fr	dissemination of published and unpublished scientific research papers.
24	IEEE Xplore Digital Library	An online database of scientific and technical content published by the
25	ieeexplore.ieee.org	Institute of Electrical and Electronics Engineers and its publishing partners.
26	Ingenta Connect	A provider of digital delivery of scholarly publications with free abstracts and
27	ingentaconnect.com	full-text available by subscription or pay-per-view. The service contracts with
28		publishers to include their content.
29	Institutional Repository (IR)	An online site for collecting, preserving and disseminating the free full-text
30		intellectual output of the author's institution in digital form. Articles are self-
31		deposited by authors or their delegates at each institution.
32	Journal Publisher's Website	An online site controlled by a peer-reviewed journal's publisher for the
33		purpose of distributing the journal's content. The content may be available as
34		free full-text, through subscription by an institution, or for a fee.
35	JSTOR	An online digital library of academic journals, books, and primary sources.
36	jstor.org	JSTOR invites selected publications to take part in their service, which
37		includes licensing and digitizing content.
38	Mendeley	An online tool used for managing and sharing research papers, discovering
39	mendeley.com	research, and collaborating. Articles and citations are added to Mendeley by
40		its authors and site users.
41	ProQuest-CSA	An online combination of information sources from CSA (formerly Cambridge
42	csa.com	Scientific Abstracts) and its parent ProQuest Information and Learning. The
43		database has partnerships with content creators
44	PubMed	An online index of biomedical literature from MEDLINE, life science journals,
45	pubmed.gov	and online books presented by the National Center for Biotechnology
46		Information (NCBI). Publishers apply to have journal indexed in the
47		database, and the selection of publishers occurs three times annually.
48	PubMed Central	An online digital database with predominantly full-text scientific literature in
49	pubmedcentral.gov	biomedical and life sciences subjects presented by the United States National
50		Center for Biotechnology Information (NCBI). Publishers who have an
51		agreement with NCBI deposit full-text articles in the database. Authors who
52		publish their NIH funded research in peer-reviewed journal articles must also
53		archive a final peer-reviewed manuscript in PubMed Central.
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Refdoc cat.inist.fr	The online access point for a digital scientific library provided by the French Institute for Scientific and Technical Information-National Center for Scientific Research (Inist-Cnrs), France's largest governmental research organization.
RERO rero.ch	An online digital library from the library network in western Switzerland.
ResearchGate researchgate.net	An online service that enables scientists to make their research available. Authors add their articles to ResearchGate.
SAO/NASA ADS Physics Abstract Services adsabs.harvard.net	An online digital library of Astronomy and Physics citations and some full-text literature provided by the Smithsonian Astrophysical Observatory (SAO) under a National Aeronautics and Space Administration (NASA) grant and hosted by the High Energy Astrophysics Division of the Harvard-Smithsonian Center for Astrophysics. Journals are evaluated for inclusion. Missing citations for applicable articles may be submitted by the databases users.
Scitation link.aip.org	A re-launch of the Online Journal Publishing Service (OJPS) that provides access to online sci-tech publishing by AIP Publishing and online journals hosted for AIP member societies.
Storming Media stormingmedia.us	A private independent online source for abstracts from the Pentagon and other U.S. government agencies.
Translation (from English)	Online service that provided scholarly papers or citations to papers translated from English into a foreign language. No specific domain name affiliation was identified for this category.
Unlinked Citations	Basic publication information about a scholarly paper that was not linked to another source within GS.

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