



Google Scholar Goes to School: The Presence of Google Scholar on College and University Web Sites

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This study measured the degree of Google Scholar adoption within academia by analyzing the frequency of Google Scholar appearances on 948 campus and library Web sites, and by ascertaining the establishment of link resolution between Google Scholar and library resources. Results indicate a positive correlation between the implementation of Google Scholar link resolution and the degree of Google Scholar adoption.

INTRODUCTION

Google Scholar has now been available to academia for more than two years. This free resource, with its very basic and familiar interface, could potentially serve as an alternative to metasearch engines such as MetaLib and WebFeat, and the more sophisticated and decidedly more expensive citation indexes Elsevier's Scopus and Thompson Scientific's Web of Knowledge. The reviews and critiques of Google Scholar have been, at best, mixed. The content, the search engine, the interface, and the citation counts of this product have all been criticized. Yet, despite these many published caveats and warnings of Google Scholar inadequacy, it is probable that academic scholars, attracted by the simplicity and familiarity of the Google interface, are now using Google Scholar in ever-increasing and substantial numbers. To what extent then has Google Scholar found a home on campus? How often does Google Scholar grace the Web sites of universities and colleges? Does the degree of Google Scholar utilization and adoption vary by type of academic institution? Is there a discernable relationship between promotion of Google Scholar and its prevalence and prominence within the campus Web space? To what degree is Google Scholar arrayed on the Web sites of library and information studies (LIS) programs?

This study summarizes reviews and research on Google Scholar from the past two years. New questions are raised concerning the degree and nature of Google Scholar as a presence within the framework of university and college research. As part of this study, a series of experiments, designed to determine the degree of Google Scholar utilization and adoption, were conducted and are here described, discussed, and followed by conjectures on the impact of Google Scholar and the possible directions for further inquiry.

Recent Studies and Critiques of Google Scholar

Research on and about Google Scholar has been confined by the sheer novelty of this search engine, to the past two years. Studies and discussions to date have focused on one or more of the following five questions: the relative strength of the Google Scholar search engine, the quality and quantity of Google Scholar "Cited by" entries relative to Web of Science and Scopus, the content of Google Scholar and the rate at which new content is added, the degree to which libraries are adopting and promoting Google Scholar, and the number of libraries

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providing link resolver access from Google Scholar to their institutional resources.

The Google Scholar Search Engine and Interface

Soon after the release of Google Scholar, Peter Jacso served as the point-man for Google Scholar search capabilities and content analysis. Early into the release of Google Scholar, Jacso urged Google to improve its new product by incorporating the metadata provided by publisher's archives and by creating indexes to utilize this metadata. Jacso also encouraged Google to equip Google Scholar with a search interface that would offer pull-down menus for limiting searches to journal, publisher, and document type.¹ In a second critique of search capabilities, Jacso drew attention to the fact that the intrepid researcher is unable to use standard search options such as truncation and proximity while searching Google Scholar. Jacso noted that Google Scholar appears to have significant problems with Boolean operators and publication-year limits. This lack of reliable basic search options was compounded by the absence of browseable or searchable index fields for Author and Journal.²

Felter compared the Google Scholar interface with that of the search engine Scirus. Though Scirus clearly has the more sophisticated interface, Felter argued that most researchers preferred the simplicity of Google and would likely opt for Google Scholar over many more capable, but complicated, databases.³ Henderson tested the search capabilities of Google Scholar and found a ranking bias toward older articles that had, as the result of the passage of time, been cited the greatest number of times. Henderson also lamented that Google Scholar lacked the standard Google search feature "Similar pages" and the "Did you mean:" feature for alternative spellings.⁴ More recently, Golderman and Connolly applauded the compatibility of Google Scholar with bibliographic software such as Endnote and RefWorks, but faulted Google Scholar for failing to include search histories, alert services, and utilities for sorting, marking and saving results.⁵

The Relative Strength of Google Scholar as a Citation-Index

In their study of Google Scholar citations, Kousha and Thelwall found strong correlations between Google Scholar and ISI Web of Science for biology, computer science, and physics journals. They found more moderate, but still statistically significant, correlations between citations from Google Scholar and ISI for journals in sociology/psychology, education, chemistry, and economics. Kousha and Thelwall also demonstrated significant correlations between Google Scholar citation counts and ISI Journal Impact Factors.⁶ Noruzi tested the citation counts for thirty-six frequently cited papers in the field of webometrics in both Google Scholar and Web of Science. Google Scholar identified more citations than Web of Science for all but three of these articles.⁷ Bakkalbasi and Bauer compared citation counts in Google Scholar, Web of Science, and Scopus for 1985 and 2000 articles from the journal *JASIST*. They found that while Web of Science returned the most citation counts for 1985, Google Scholar tallied the highest citation counts for all *JASIST* articles published in 2000.⁸ Jacso weighed-in during June 2005 plaintively noting that Google Scholar fell far short of two other free citation databases CiteSeer and eBizSearch, though Jacso conceded that Google Scholar might well be valued at institutions lacking the funds to support either Web of Science or Scopus.⁹ In another published

comparison of Google Scholar, Scopus, and Web of Science, Jacso investigated the relative coverage of the most heavily cited papers from the journal *Current Science*. Jacso found that for the sum total citation count of all thirty articles in question, both Web of Science and Scopus out-performed Google Scholar by a three to one margin.¹⁰ Bakkalbasi, Bauer, Glover, and Wang analyzed the number of citing references for articles from the fields of oncology and condensed matter physics as generated by Web of Science, Scopus, and Google Scholar. They found that while Web of Science and Scopus did return more citing references than Google Scholar, Google Scholar returned the largest number of unique references. These authors concluded that no one of these three resources clearly outperformed the others and that a researcher relying on just one or even two of these resources might fail to find all references.¹¹ In their comparative bibliometric study of Web of Science, Scopus, and Google Scholar, Menho and Yang concluded that for the field of library and information science Google Scholar provides citations from a broader array of sources than either Scopus or Web of Science, though many of these additional sources come from low impact journals and conference proceedings.¹²

Google Scholar Content and Rate of Updating

The collection management policies and practices of Google Scholar are something of a mystery. The content of Google Scholar, also an enigma, has been studied and guessed at since Google Scholar was first introduced. Jacso was one of the first to analyze the possible content of Google Scholar and to criticize Google Scholar for its obscurity, its inclusion of nonscholarly material, and its many omissions and redundancies.¹³ Inviting others to test Google Scholar for themselves, Jacso created and then updated a Web site that allows the curious to compare search results of Google Scholar with search engines of publishers Annual Reviews, Blackwell, Institute of Physics, Nature Publishing Group, and Wiley Interscience.¹⁴ Robinson and Wusteman found that for scientific literature, Google Scholar outperformed Ask.com, Google, and Yahoo! in terms of precision, recall, and retrieval of top ranked pages. However, Google performed poorly in these same tests for nonscientific literature.¹⁵ Gardner and Eng utilized a standard search to test the content of Google Scholar against the content of PsycINFO, ERIC, and the ISI Social Science Citation Index. For the search <homeschooling OR "home schooling"> these authors found only modest to minimal overlap between Google Scholar and these three social science databases.¹⁶ Investigations by Giustini and Barsky identified PubMed and nine scientific and medical publishers from the CrossRef Search pilot project as major content contributors to Google Scholar.¹⁷ Walters compared Google Scholar to the databases Academic Search Elite, Ageline, ArticleFirst, GEOBASE, POPLINE, Social Sciences Index, and Social Sciences Citation Index. For a core list of 155 articles on later-life migration, published between 1990 and 2000, Google Scholar was found to index the greatest percentage of titles. Walters cautioned that despite this strong performance, roughly one third of all Google Scholar citations were incomplete, and that one third of all Google Scholar entries studied lacked abstracts.¹⁸ In a comparison of Google Scholar with the Chemical Abstracts Service, Levine-Clark and Kraus found that Google Scholar returned more results than the Chemical Abstracts Service for topical searches, but that the reverse was true for chemical compound and

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