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Has the Web really contributed to a decline in the scholarly quality of undergraduate citation behaviour?: a Canadian case study

Abstract: This paper reports on a pilot study designed to further and expand upon the work of Philip M. Davis and Suzanne A. Cohen at Cornell University. It attempts to determine whether student's increasing reliance on the Internet is actually affecting the quality of their research by conducting bibliometric analysis of papers submitted by Canadian politics students at the University of Regina in the fall semester of 2002. One of the paper's major contributions is the explanation and justification of the process that was developed for assessing the scholarly nature of electronic citations. The paper concludes that, while the majority of students' electronic citations do not refer to scholarly sources, it would be a mistake to assume that the Internet is contributing to a decline in the quality of student research. Rather, it appears to be providing them with access to a wider breadth of resources.

Résumé: Cette communication est le rapport d'une étude-pilote mise en place dans le but d'approfondir et d'élargir le travail de Philip M. Davis et Suzanne A. Cohen de l'Université Cornell. Elle tente de déterminer si la confiance croissante accordée par les étudiants à l'Internet a un effet évident sur la qualité de leur recherche, ceci en conduisant une analyse bibliométrique des travaux écrits remis par les étudiants en politique canadienne de l'Université de Regina au cours du semestre d'automne 2002. Une des contributions majeures de cette étude est l'explication et la justification du processus qui a été mis au point pour évaluer la nature de la recherche au sujet des citations électroniques. L'étude conclut qu'alors que les citations électroniques de la majorité des étudiants ne font pas référence à des sources de recherche, ce serait une erreur que d'assumer que l'Internet contribue au déclin de la qualité de la recherche des étudiants. En fait, il semblerait plutôt leur donner accès à un éventail plus étendu de ressources.

1. INTRODUCTION

What effect is the Internet having on undergraduate scholarship? Since the mid-1990s academic concern with the way students use the Internet in conducting their research has grown hand-in-hand with the popularity of the Internet among students. While there is evidence that most faculty accept the Internet as a legitimate research source for undergraduate essays (Herring) and anecdotal evidence that some even encourage its use (Kapoun, 1998), there is even more evidence that faculty are not satisfied with the way students are employing it. Studies show that there is a gap between how faculty believe students should use the Internet and how students actually use it (Davis, 2002; Grimes and Boening, 2001) and that faculty and librarians believe that students are "unaware of [the Internet's] limitations, [and] fail[] to recognize issues of reliability, validity, or authority" (Herring, 2001).

This paper reports on a pilot study designed to further and expand upon the work of Philip M. Davis and Suzanne A. Cohen at Cornell University. It attempts to shed light on the actual effects of the Internet on the scholarly quality of student citation behaviour by evaluating the scholarly quality of the Web-based sources which students are citing. It asks whether student's increasing reliance on the Internet is actually affecting the quality of their research.. While it has been suggested that students' increasing reliance on Internet research has been reducing their reliance on traditional print scholarly sources (Davis and Cohen, 2001; Davis, 2002), we cannot say for sure what the effect of this trend has been on the scholarly content of their research, without evaluating the quality of their Internet sources. Our evidence suggests that, while the majority of students' electronic citations do not refer to scholarly sources, it would be a mistake to assume that the Internet is contributing to a decline in the quality of student research. Rather, it appears to be providing them with access to a wider breadth of resources.

2. PREVIOUS RESEARCH AND RELATED LITERATURE

The research to date has been valuable in helping to answer important questions about the impact of the Internet on undergraduate scholarship. While Davis (2002) has gone so far as to describe the current situation as a 'crisis', we believe more work needs to be done before such a conclusion should be drawn. As this project builds on his work, this is where we will begin.

In a groundbreaking study Davis and Cohen (2001) conducted a comparative citation analysis of bibliographies of undergraduate term papers submitted in 1996 and 1999 for an economics class at Cornell. Citations were classified as book, journal, magazine, newspaper, web, or other. Journal, magazine, and newspaper articles were classified as such if the source document was available in print form, even if students had cited them as being accessed online (311). Their study had a number of important findings that are relevant to this study. First, there was a statistically significant drop in the average number of books cited by students (from 3.5 to 2.2) and statistically significant increases in the average number of newspaper citations (from 0.9 to 1.9) and in the average number of web citations (from 1.1 to 2.5) (312). Second, when the authors grouped these categories as 'scholarly' (book and journal citations) and 'nonscholarly' (newspaper and magazine citations), they found a statistically significant decline in student use of scholarly citations (from 6.1 to 4.6), but "no corresponding significant increase in the mean use of nonscholarly materials" (312). This pattern was confirmed when Davis conducted the same analysis on papers submitted in 2000 (Davis, 2002). A further study, conducted using the same method of bibliometric analysis in 2001, found that when students were faced with academic penalties for using less than five "published, scientific (peer-reviewed or university press) articles or pre-prints" the "number of scholarly citations (the culmination of books and journals) returned to 1996 levels." Interestingly, while the average number of scholarly citations was similar to the 1996 average, the composition of scholarly citations shifted from near parity between book and journal citations to one dominated by journal citations (Davis, 2003).

Of interest to the present study, while Davis and Cohen's studies suggest that without serious intervention by the instructor the Web has contributed to a decline in the scholarly content of student citations, these conclusions were drawn by *excluding Internet sources* from the analysis. The reason, Davis wrote, was that "many of the Web citations do not presently work, and those

that do work are mutable and difficult to judge by nonexperts” (Davis, 2002, 57). Thus, while Davis and Cohen’s work is clearly important and has advanced our understanding of student citation behaviours in the age of the Internet, we do not believe it is clear that their results necessarily demonstrate a decline in the scholarly quality of student research. Where web citations represented 21%, 22%, and 13% of total citations in 1999, 2000, and 2001 respectively (Davis forthcoming), the exclusion of such citations from the analysis is problematic.¹

Davis acknowledges that the exclusion of the Web sites from the analysis “may have created unreliable results” but suggests that based on his observation of the sites student cited, the inclusion of Internet citations in the analysis may well have resulted in a balance “more heavily weighted to nonscholarly resources.” (Davis, 2002, 59) It seems fair to say that general opinion supports Davis’ suggestion. The little research that has been published on this matter also seems to confirm his suspicions. For instance, in 1997 Gillette and Videon found that of 36 working URLs cited by students in a composition class, 42% pointed to papers written by other students and a further 8% were suspected to be papers written by students (1998, 191). Similarly distressing, in a study of student use of Web sources in a community college English composition class, Grimes and Boening reported that “students were asked if it concerned them that at least one source selected by a fellow student was a personal home page of a sixteen-year-old fan. No one expressed any concern, asserting that such a site was suitable for college research assignments” (2001, 20).

The present study builds on Davis and Cohen’s work by adopting their method of bibliometric analysis (with some minor modifications) and expanding it by evaluating the scholarly quality of students’ Web citations. We believe this is necessary to arrive at a thorough understanding of the impact of Internet citations on the quality of student research. The attempt to evaluate Web citations is not entirely new. Grimes and Boening, for instance, included it as part of their evaluation of students’ use of the Web. Their approach, however, was not suited for integration into a study of the nature of Davis and Cohen’s because it cannot yield reproducible evaluations of individual WebPages. They applied ten criteria to evaluate the WebPages students had cited (authorship; currency; recommendations; perspective; audience; style and tone; quality of content; organization of information; publisher, source, host; stability of information). This worked fine for their purpose, which was to describe the general quality of the WebPages students were citing. It is not useful for evaluating WebPages within Davis and Cohen’s bibliometric analysis because this requires a definitive assessment of each Web citation taken individually. There is no obvious algorithm that could facilitate the application of these ten criteria to individual WebPages. One possibility, only classifying those WebPages as scholarly that met all ten criteria would be too strict a test. Another possibility, allowing the person doing the evaluation to subjectively balance these criteria would preclude the possibility of applying this classification in a reproducible way—how a particular WebPage was classified would be too dependent on who was conducting the research.

For guidance in constructing our approach, we looked to the work that has been done on the critical evaluation of Internet sources. This literature has displayed a great deal of convergence. Most who have contributed to it have settled upon modifications of the five traditional criteria that have been used for evaluating the quality of print materials: authority, accuracy, currency, objectivity, and scope/coverage. (Tate and Alexander, 1996; Kapoun, 1998; Scholz-Crane,

1998)² Tate and Alexander have operationalized these criteria into a set of checklists that they have made freely available upon the Internet. This literature provides non-discipline-specific criteria for judging WebPage quality. These criteria offer the possibility, if modified appropriately, of devising a method for assessing the scholarly quality of individual WebPages.

3. METHOD

Subjects

This study was conducted at the University of Regina in the fall semester of 2002. It involved conducting bibliometric analysis³ on the bibliographies of essays submitted by students in the second-year Canadian Politics course (PSCI 230), of which there were two sections. Out of respect for students' intellectual property rights, student consent was requested at the beginning of the semester. Student confidentiality was respected by photocopying the bibliographies, numbering them for analysis, and removing any personal information. This generated a total of forty-six bibliographies for analysis.

Bibliometric Analysis

In conducting the bibliometric analysis we tried to stick fairly close to Davis and Cohen's approach.⁴ Davis and Cohen's typology of Book, Journal, Newspaper, Magazine, and Other⁵ was employed as was their practice of defining journals as "scholarly periodicals that contain primary research or substantial policy and analysis" and magazines as "nonscholarly periodicals that report primarily news, industry information, and events" (Davis and Cohen, 2001, 311). We decided, however, to modify this slightly by creating a separate category for Government Documents which Cohen had included in Other (Davis, 2003). This need seems to have arisen from the fact we were studying political science students who were more interested in government documents than the economics students studied by Davis. We also followed Davis and Cohen in classifying book and journal citations as scholarly and magazine and newspaper citations as nonscholarly. We decided to classify our new category, government documents, as scholarly as well.

We chose *not* to follow Davis and Cohen's practice of coding "traditional print materials [i.e., print (vs. exclusively online) newspapers, magazines, and journals]...as such, even if they might have been accessed electronically" (Davis, 2002, 55). While we realized that this would make our results less comparable to theirs,⁶ we decided that we could produce more useful data by classifying sources as print or electronic based upon how students presented them in their bibliographies (i.e., if they cited a URL (universal resource locator) or indicated 'Internet' etc., we treated the source as electronic).⁷ Thus, a citation of an article from a major newspaper that was cited by a URL was classified as an electronic citation. Similarly, if a student indicated that an article from a print academic journal had been accessed electronically (either on the Internet or through an electronic database), it was also classified as electronic. If there was no indication that the citation was electronic, we assumed it was accessed from a print version.

These subdivisions necessitated that we create parallel groupings for electronic sources. Thus instead of using Davis and Cohen's general 'Web' category, we created six categories for electronic sources: Electronic--Scholarly, Electronic—Journal, Electronic—News, Electronic—Magazine, Electronic—Other, and Electronic—Low Quality. The method by which this classification took place is described in the next section.

The grade attained by each assignment was also noted for regression analysis. Davis conducted regression analysis, comparing the number of scholarly citations to grade and found no significant relationship in his 2000 sample (Davis, 2002, 58). While this is not central to our research question, Davis' finding was curious enough to warrant our conducting this simple calculation to see if it was repeated here.

While we considered following Davis and Cohen in tracking the URL stems of student Web citations (i.e., com, .edu, .org, .gov, .net) (Davis and Cohen, 2001, 311), it became immediately obvious that these do not translate very well outside of the American context. While .com and .org are in fairly common use in Canada, there is no consistent pattern of usage in Canada as many Canadian URLs use a national stem (.ca). As this made such comparisons of limited value, we decided it was not worth doing.

Finally, a central concern for Davis and Cohen was the accuracy and persistency of URLs. Their concern with persistency made it logical for them to wait at least six months before searching for the URLs (Davis and Cohen, 2001, 311). Since we were most concerned with the scholarly content of student Web citations, we checked them as soon as was ethically justifiable—i.e., after final grades had been submitted for the course (typically 4-7 weeks). While this did not allow for analysis of the comparable analysis of the persistency of Web citations, it did allow for comparison of accuracy. As with most of the other forms of analysis described above, we followed Davis and Cohen's approach for locating WebPages cited by inaccurate URLs (see Appendix A, footnote 1) We, however, only recorded whether the URL worked as found in the bibliography and whether the cited WebPage was ever found at all. As it turned out, all 113 Internet citations were located.

Coding Web Citations

We consider this to be the most unique contribution of this study to the growing literature on undergraduate citation analysis and the Internet. Our system for coding Web citations was developed through an iterative process. We began by attempting to apply Alexander and Tate's five checklists. Each checklist is intended to be applied to a different type of WebPage (advocacy, business/marketing, news, informational, or personal) and each lists questions which are further subdivided by five traditional evaluative criteria: authority, accuracy, objectivity, currency, and coverage. (Alexander and Tate, 2001) It quickly became obvious, however, that checklists designed to assess the 'quality' of a WebPage were not well suited for our purposes. Each checklist contained more than ten questions. While this is probably well-suited for making *subjective judgements* as to the general quality of a WebPage, it was not well suited for making *objective, consistent, and reproducible* assessments of the scholarliness of WebPages.

The questions in these checklists, however, did provide a useful starting place, as did the Wolfram Memorial Library's WebPage describing differences between Scholarly and Non-Scholarly print journals (Wolfram Memorial Library, no date). After a second iteration, we settled on a checklist that we believe strikes a reasonable balance between providing objective rules that will enhance inter-coder reliability and consistency in coding, while minimizing the number of instances in which such objective coding is inconsistent with intuitive professional assessments (see "WebPage Evaluation Checklist", Appendix A). In determining the criteria that appear in the checklist, we were guided by four principles. The first three concerned the method of classification itself. First, if a reasonable analogy could be drawn between our classification of Internet citations and Davis and Cohen's classification of print materials, we tried to make our Internet classifications consistent with theirs. Second, if this proved unhelpful, we tried to draw analogies between common practice with respect to print materials and our classification of Internet materials. And third, if neither of these helped, we went with the conservative approach of adopting the alternative that seemed least likely to classify an Internet citation as scholarly. The fourth principle concerned the amount of effort that should be expended in searching for answers for some of the items on the checklist. In this regard, we decided to limit ourselves to what we considered would be a reasonable effort on the part of an undergraduate and, thus, to refrain from using any tools, techniques, or discipline-specific knowledge that might only be available to a librarian or professional academic.

The WebPage Evaluation Checklist is divided into three parts and is designed to place each Web citation into one of seven mutually exclusive and exhaustive classifications. Part I asks whether the URL, as found in the student bibliography, worked. As noted above, where a URL did not immediately lead to the WebPage we followed Davis and Cohen's methodology for attempting to locate it. If the WebPage could not be located by the end of this process, it was classified as inaccessible.

In Part II WebPages are classified as either quality or low quality. This classification was considered important since, as noted in the literature review, there is a widespread assumption that students are citing everything they find on the Internet, no matter how dubious its origin. The checklist reflects a very minimal standard for making this classification: if it is not clear who is responsible for posting the WebPage or there is no way of verifying their legitimacy beyond an email address (e.g., postal address, phone number), then the citation is low quality. In trying to limit ourselves to the reasonable effort of an undergraduate, we restricted ourselves to searching for this information on the cited WebPage, the Home Page, and from any obvious links which could be found on the Home Page (e.g., "Contact Us"; "Feedback", etc.). If a citation was classified as low quality, the evaluation was complete.

Some may find these criteria for determining the quality/low quality classification controversial. We settled on them for two reasons. The first arose through the iterative process by which the checklist was developed. In our experience, no *additional* criteria could be added without eliminating clearly credible WebPages. For example, one possibility we rejected was Alexander and Tate's question as to whether there was a link describing the goals of the organization responsible for the WebPage. This would have resulted, for example, in a hypothetical WebPage entitled 'Citizens Against Abortion' which included a contact address or phone number being considered quality if it included an 'about us' link, but low quality if it did not. In either case,

the organization's purpose would have been obvious. While excluding the 'about us' criteria does create the theoretical possibility that WebPages posted by organizations with cryptic names and a phone number would be treated as 'quality,' we experienced no such cases. In fact, most WebPages retrieved by students provided information that appeared legitimate and gave an adequate accounting of the responsible individual or organization's identity and purpose.

The second reason for sticking to these criteria addresses the concern that our list of 'quality' WebPages will be over-inclusive. If we reflect on Davis and Cohen's classification of print materials, we will quickly realize that they make the (heroic?) assumption that it is reasonable to classify citations of books and journals as scholarly by virtue of their being books and journals.⁸ This is a necessary assumption for this kind of research to be conducted, but it obviously neglects the facts that some journals are not peer-reviewed and that many books are either not very scholarly or, even worse, published by vanity presses. The only difference between a low quality book and a low quality WebPage is that it probably takes more money to get a low quality book into print. Thus, the quality/low quality classification is designed to eliminate from consideration those WebPages which are analogous to books that lack authors and/or publishers.

Part III of the checklist classifies the quality WebPages. It is here that we have operationalized our idea of a scholarly WebPage. This checklist is applied in sequential order, and begins by making classifications analogous to Davis and Cohen's classification of print materials. Electronic sources which clearly fall within the category of News, Magazine, or Journal are so classified. Second, we draw an analogy with common practice to classify electronically-accessed Government Documents as such. Third, we apply a negative test for identifying scholarly WebPages by eliminating those which fall short on grounds specific to the Internet (i.e., WebPages riddled with "grammatical, spelling and typographical errors"; WebPages in which advertising is not "clearly differentiated from the informational content"; and WebPages which are obviously incomplete or "still under construction").⁹ WebPages which fail this test are classified as Electronic—Other. In the final section we invoke a positive conception of the nature of a scholarly publication by asking whether "the author's qualifications for writing on this topic" can be established from the WebPage (or linked WebPages);¹⁰ and whether "the sources for any factual information [are] clearly listed so they can be verified in another source" (e.g., in notes or a bibliography).¹¹ Any WebPage which meets both of these criteria is classified as Electronic—Scholarly. Any that do not are classified as Electronic—Other.

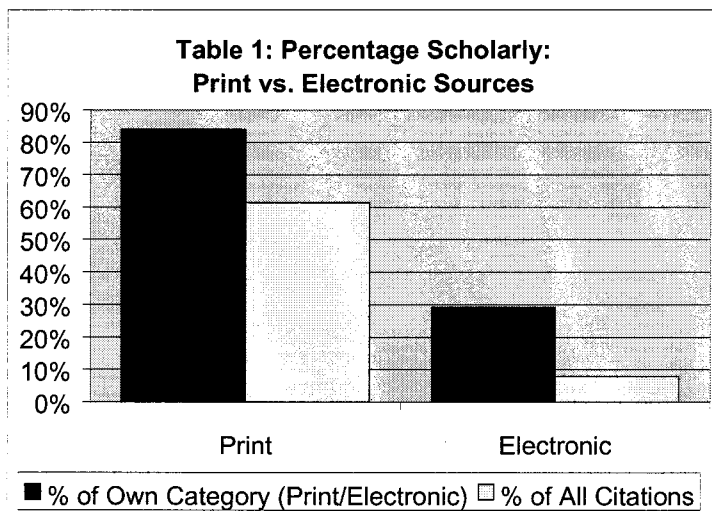
For comparing the scholarly nature of print to electronic citations, Electronic—Scholarly, Electronic—Journal, and Electronic—Government Document are grouped as scholarly and Electronic—News, Electronic—Magazine, and Electronic—Other are grouped as nonscholarly.

4. RESULTS

Student Citation Behaviour and the Internet

We should begin with some general observations. First, students are making extensive use of the Internet in researching their essays. Fully 27% of the citations in this study were derived from electronic sources. This was consistent with Jenkins' finding of 24% Web citations (Jenkins,

2002) and with Davis' findings in 1999 and 2000 of 21% and 22% respectively (Davis, 2003, 13).¹² Further, 36 of the 46 bibliographies included at least one reference to an electronic source and the 'average' paper included 2.5 electronic citations. Conversely, all the papers included citations of at least one print source.



Scholarly Content of Internet Citations

Perhaps more surprising, we found that the citations students are using for their research are generally quite good. Fully 29% of the sources students cited as electronic were classified as scholarly (electronic--scholarly, journal, government document). While this is certainly a lot lower than the 84% we found for scholarly print citations, not too much should be read into this difference. If the real concern about the Web is that students are using it indiscriminately, our study suggests they are not: only 8% of the electronic citations were classified as Low Quality (an average of 0.2 per paper).

Students Access Different Types of Information from Print and Electronic Sources

When one compares the distribution of citations between print and electronic sources, the obvious implication is that students tend to be looking for different kinds of information from each of these media. They seem to be going to traditional media for traditional sources of information. For example, of 227 citations of books, all were accessed in print. Of 27 citations of journal articles, 23 were in print, although roughly one half of these were in fact available electronically. However, it is possible that students failed to cite these as such. Newspaper citations were more evenly balanced 26 print, 14 electronic. This should probably not be surprising given the investment news sources have made over the last ten years in providing online access to their content.

What was most striking was that students seem to be going to the Internet to access information which has historically either been unavailable to them in print due to individual libraries' collections policies, or at least difficult to access. Thus, for example, of 31 citations of government documents, 23 had been accessed electronically. Of the 51 citations that were

classified as Internet-Other, 16 were to interest group Web sites and 30 were to political party Web sites, political speeches, the home pages of elected officials, and press releases. Together

Table 2: Print Citation Sources: As Percentage of Print Citations vs. As Percentage of All Citations

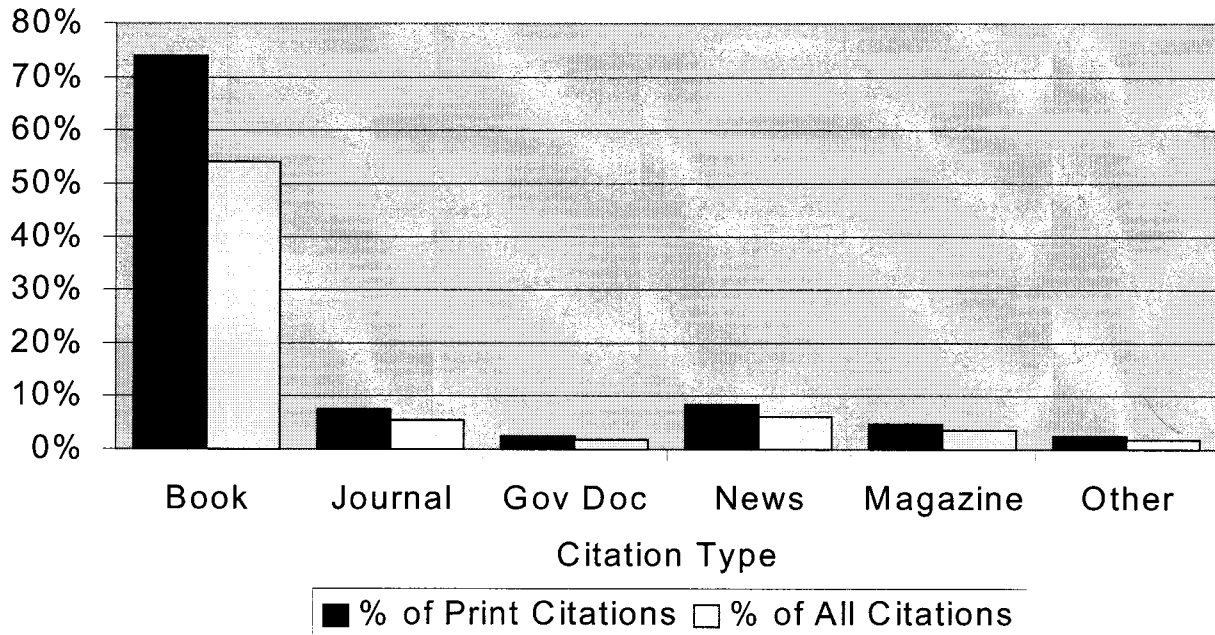
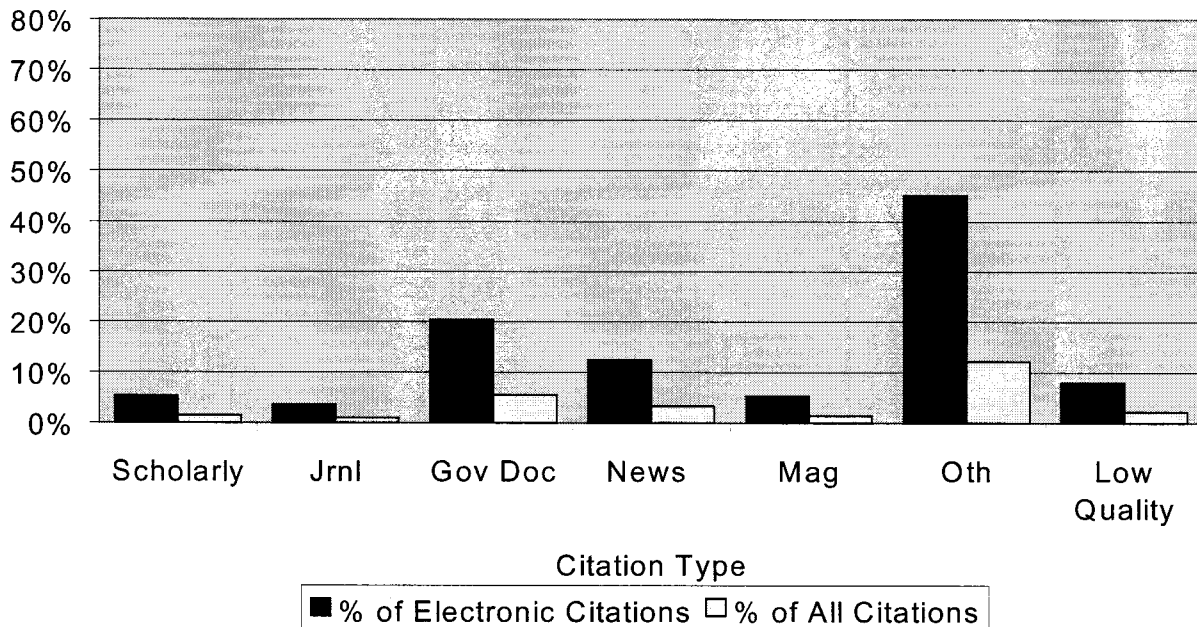


Table 3: Electronic Citation Sources: As Percentage of Electronic Citations vs. As Percentage of All Citations



these accounted for 41% of all electronic citations. While no one would ever mistake these for scholarly sources, if used appropriately they certainly have a place in an academic research paper. Thus, if we grouped these together with the previously identified scholarly electronic sources our study found that 70% of the electronic citations were *not inappropriate* for academic research. This compares favourably with the 84% scholarly citations we found for print sources.

Relationship of Citation Behaviour to Grade

Regression analysis was used to determine Pearson's r measures of correlation to assess whether there was any relationship between the grades students attained and: the total number of sources students cited; the total number of scholarly sources; the total number of print sources; the total number of electronic sources; the percentage of scholarly sources; and, finally, the total number of print scholarly sources (what Davis measured in 2001).

Our study yielded results similar to Davis'. A Pearson's r was determined for the relationship between grades and the number of print scholarly sources and total (print and electronic) scholarly sources and no significant correlation was found ($r=.24$, $p>.10$). Significant relationships were found, perhaps not surprisingly, between the total number of sources students used ($r=.483$, $p<.01$) and the total number of print sources students used ($r=0.432$, $p<.01$).¹³ This is not surprising given our finding that the vast majority of sources students are citing from the Web, while not scholarly, are not low quality either.

4. DISCUSSION

Implications for Teachers

The general conclusion we draw from this study is somewhat paradoxical. On the one hand, taken as a whole, student citations of electronic sources are not nearly as scholarly as their citations of print materials (29% versus 84%). Thus, there is a very real sense in which access to the Internet appears to be diluting the scholarly quality of student research. On the other hand, our finding is that for the most part, student use of the Internet is not resulting in a great increase in the use of clearly inappropriate sources. While the 8% of Web citations that were classified as Low Quality is clearly unacceptable, this is not nearly the disaster which Gillette and Videon's and Grimes and Boening's studies seemed to describe.

Further, this study suggests that we might want to be careful in applying the idea of a scholarly source. While an academic paper completely void of scholarly sources is clearly unacceptable, it is not so clear that papers are necessarily better the higher the percentage of scholarly sources they cite. This was confirmed by our finding of no statistically significant relationship between percentage of scholarly sources and grade. It is also confirmed upon reflection. Any paper, for instance, that examines political parties, environmental activism, or any story that is currently in the news, will be improved if reference is made to timely, nonscholarly sources like newspapers and magazines or to the philosophies, policies, or activities of individuals and organizations active in the relevant area. To the extent that the Web gives students ready access to such information which libraries do not tend to collect, it seems likely to improve the quality of

student research. Thus, as noted above, students appear to be going to print and electronic sources for different kinds of information.

This conclusion is, of course, open to the criticism that it is in the nature of political science that students would make such use of electronic access to government, political party, and interest group sites. A determination of whether this optimistic conclusion held up across disciplines would, of course, require further study.

Implications for Academic Libraries

This study also confirms what other studies have suggested, but not made much of—traditional scholarly print sources (books and journals) remain significant research sources for undergraduates. Jenkins (2002) found they represented 76% of citations across six disciplines (with extreme variations across disciplines), Davis (2002) found they represented about 37% in economics (compared to approximately 53% in 1996), and our study found 59% for political science or 5.4 book and journal citations per bibliography. In this instance one could argue that there does seem to be somewhat of an under-representation of journal literature. While there is much discussion in academic libraries these days on the print versus electronic dynamic, a focus on usage patterns of undergraduates regardless of format would perhaps be of greater relevance, particularly when faced with the ongoing battle of reducing subscription expenditures. On a more optimistic note, while increased use of the Web must necessarily push the percentage of traditional sources down, the fact that traditional sources appear to be holding their own and that students are not using the Web solely as a new way to find traditional sources, suggests that there will continue to be a future for academic libraries as sources of scholarly resources.

APPENDIX A

Web Evaluation Checklist

URL: _____
Approximate Name (if necessary): _____
Bibliography Number(s): _____

I. URL ACCURACY

Did the URL work as found in the bibliography? ____ Yes (continue with part II.) ____ No (continue)

Proceed in the following order:¹⁴

Was the WebPage found after checking the URL for obvious typographical errors and trying again?

____ Yes (continue with part II.) ____ No (continue)

Was the WebPage found after removing one directory level at a time from the URL until a working web page was found and examining this WebPage for any obvious links to the cited WebPage?

_____ Yes (continue with part II.) _____ No (continue)

Was the WebPage found after locating the Home Page and searching for the cited WebPage using “site maps, internal search engines, etc.”?

_____ Yes (continue with part II.) _____ No (continue)

Does the student’s citation include an author and or title for the cited WebPage?

_____ Yes (continue) _____ No (end of analysis—the WebPage is inaccessible)

Was the WebPage found in the first screen of results when the cited author and/or title was entered into *Google*?

_____ Yes (continue with part II.) _____ No (end of analysis—the WebPage is inaccessible)

II. EVALUATION OF QUALITY

To make this determination limit yourself to searching for this information on the cited WebPage, on the Home Page (which could be identified by a link on the cited WebPage or by removing one directory level at a time from the URL), or from any obvious links which could be found on the Home Page (e.g., “Contact Us”; “Feedback”, etc.).

Both questions must be answered in the affirmative. **If not**, the WebPage is low quality.¹⁵

_____ “Is it clear what organization [company, or individual] is responsible for the contents of the page?”

_____ “Is there a way of verifying the legitimacy of this organization [company, or individual]? That is, is there a phone number or postal information? (Simply an email address is not enough.)”

Quality _____ (continue with part III) Low Quality _____ (Analysis is complete—WebPage is low quality)

III. SCHOLARLY/NON-SCHOLARLY

The following questions must be applied to the **specific WebPage** to which the student’s citation points, unless otherwise indicated.

The questions are intended to be applied **in the sequence** in which they appear.

a. If the WebPage clearly falls within **one** of the following categories categorize it as indicated?

- | | |
|---|----------------------------------|
| _____ News (Newspaper or electronic equivalent) | _____ Electronic News |
| _____ Magazine (Magazine or electronic equivalent) | _____ Electronic Magazine |
| _____ Journal (Journal or electronic equivalent) | _____ Electronic Journal |

b. If

_____ i) the WebPage is clearly maintained by a government department or agency **AND**

_____ ii) it includes information directly relating to that body and/or government publications, legislation, or other documents, classify it as a _____ **Electronic Government Document**.

c. If **any** of the following apply:¹⁶

_____ The information is riddled with “grammatical, spelling, [or] typographical errors.”

_____ Any advertising on the WebPage is not “clearly differentiated from the informational content.”

_____ The WebPage is obviously incomplete and/or “still under construction.”

classify any WebPage as _____ **Electronic Other** (i.e., Non-Scholarly)

d. For all remaining pages, if¹⁷

_____ i) it can be determined from the WebPage or from linked WebPages that the individual or corporate author responsible for it (including corporate authors of online encyclopedias, dictionaries, keywords, etc.) is qualified to write on this topic, **AND**

_____ ii) “the sources for any factual information [are] clearly listed so they can be verified in another source” (e.g., by notes, in a bibliography, suggested readings, etc.).

then code the citation as _____ **Scholarly**, otherwise classify it as _____ **Electronic Other** (i.e. Non-Scholarly)

ENDNOTES

¹ If, for instance, half of all Web citations were classified as scholarly, and these were included in the calculation of the average number of scholarly citations, the decline in the average number of scholarly citations from 1996 to 1999 would have been from 6.65 to 5.85, much more modest than 6.1 to 4.6 which Davis and Cohen reported.

² Grimes and Boening are outliers in that they defined 10 criteria, but these include the five mentioned by most others.

³ Bibliometrics is “a branch of library science concerned with the mathematical and statistical analysis of bibliographies.” Davis and Cohen, 2001, 310.

⁴ Davis and Cohen’s descriptions of their methodology were read with care, and where something was not clear, or where we encountered situations not discussed in their articles, Philip Davis proved very helpful in offering advice.

⁵ For reasons discussed below, we dropped their “Web” category.

⁶ For our own piece of mind, we analyzed the data according to Davis and Cohen’s method and our own and compared the results. The differences were not insignificant. For example, using our method electronic citations as a percentage of all citations was 27%, and scholarly electronic citations as a percentage of all electronic citations was 29%. Using Davis and Cohen’s approach,

the same figures were 20% and 15% respectively. Thus, following Davis and Cohen's approach would seem to grossly misrepresent the nature of the material students accessed electronically.

⁷ I suspect Davis and Cohen did this because they were not classifying Web citations as scholarly or nonscholarly, and thus wanted to capture as much information in their non-Web categories as possible. Since we *are* classifying Web citations as scholarly and nonscholarly, this did not seem necessary.

⁸ Similarly, Grimes and Boening write of the difference between "traditional print resources and Web resources" that "the scholarly communication system—with its checks and balances of publishers, editors, peer review, and librarians—manages and controls access to traditional print resources" (2001, 14).

⁹ These criteria based on or taken from Alexander and Tate, 2001.

¹⁰ Re: online encyclopaedia. In a personal communication Davis indicated that he classified encyclopaedias as books. Thus, in keeping with common practice for print materials, the author whose authority was to be assessed for encyclopaedia entries was the corporate author of the encyclopaedia if no author was given for the entry.

¹¹ These criteria based on or taken from Wolfgram Memorial Library (no date).

¹² As noted above, when we classified our citations according to Davis and Cohen's approach our Web citations came out to 20%.

¹³ All of the other correlations were insignificant and positive in magnitude.

¹⁴ This process is based directly upon the approach of Davis and Cohen (2001, 311).

¹⁵ Some of the questions on this page are based on Alexander and Tate's Web Evaluation checklists (2001).

¹⁶ These criteria based on or taken from Questions of currency and bias have been consciously omitted as this would require discipline-specific knowledge that would not be available to everyone who might apply this list.

¹⁷ These criteria based on or taken from Alexander and Tate (2001).

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