



Investigating student's use of Google as a research tool

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Abstract

This research paper is a result of an investigative study undertaken to identify several aspects of students' Google use behavior. The purpose of the investigation was to ascertain the extent to which students turn to Google for research purposes and most importantly, to ascertain the extent to which they utilize Google's search capabilities using its tools and advanced search options. Both graduate and undergraduate students were included in the study and although the study results have shown both student groups prefer Google as a first tool to search compared to other search engines, Wikipedia and library resources they still lack the necessary skills needed to utilize Google to its full potential and evaluate information. Graduate students by comparison tend to be savvier with using advanced search tools than undergraduate students.

Keywords: Google, information literacy, academic libraries, research, students.

Introduction

Google has become one of the most popular search engines for a lot of people and especially students due to its clean interface. For students, having to put keywords in a search box without putting much thought to the process is more attractive than having to use library databases that need some navigation with rules to follow. For students, this is a very familiar search engine as most will be familiar with searching it for leisure long before they go to University or College and long before they need to search for academic literature. Although Google seems to be clean and less complicated, there is a lot that one can do to maximize their search experience by utilizing the tools and advanced search features that are available within the search engine. Perhaps it is this simplicity that is preventing students from discovering all that Google has to offer.

This study will go further than proving that students turn to Google first for their research assignments and instead seek to understand the extent to which students use Google's search features and tools for optimum search results. Do they apply any information literacy skills, if any when they use Google, like checking whether a website is trustworthy or not? Are they aware of other specialized tools like Google Scholar or Google Books? Many studies in this area have also focused on either undergraduate or graduate students but not both population groups. In this study both undergraduate and graduate students have been surveyed. This research will also help inform librarians' teaching practices as they become aware of what gaps if any, are there in students searching behavior and knowledge of what Google has to offer.

Literature review: Ever since Google came into existence in 1996, it has become one of the most popular search engines for many students due to its simplicity. Various databases have

been searched in order to identify studies of a similar nature. As mentioned before there are numerous studies that have come to the conclusion that Google seems to be a preferred tool for students outside their own library resources, however few studies have focused on student's knowledge of Google's tools and advanced features. A study conducted by Purdy at Duquesne University in Pittsburgh sought to identify reasons for the student's choice of resource and at the top of the list was ease of use¹. The students surveyed in this study were first year students and Google was their favourite tool to use for research. The same study though also reported that "relevance" ranked lower as the reason for choosing a particular resource for research.

Another study which seems to support Google's ease of use as the reason for its popularity with undergraduate students was conducted in the United Kingdom by Griffiths, Brophy, and Fabos². Two user studies were conducted for this research and although students reported using other search engines like Yahoo! or Ask Jeeves, 45% of those students use Google first to locate information. In the study the authors reported student's comments for using Google such as: "Google is very straight forward. You put in your word and it searches. It also corrects spellings to rectify your search.", or "I find the site very helpful. It seems to have whatever I want. I'm happy with it. It is simple but complete." One library resource that was second most popular was the library Online Public Access Catalogue (OPAC) because the students were familiar with it and it was easier to find and use. Students who seemed to know more about library resources and who were not focused on Google were those enrolled in Information and Library Management studies. This is not surprising given the fact that these students will be future librarians.

Biddix, Chung, and Park conducted a study to look at student's search behaviour and to understand whether students choose convenience or credibility for a particular resource³. Although the article cites the students as using a web site more frequently than library resources, the top web site students used was Google. The authors noted that "student's preference was directly tied to efficiency, while trustworthiness and expertise were also consistent keywords in response analysis."

Badke seems to take a different approach about how librarians have failed the Net Generation⁴. Librarians, according to Badke have failed to amongst other things "introduce the Net Generation to academic libraries in such a way that they would consider the library a viable, and often better, option than simply Googling their way through their research". Although students are often told by their professors to shy away from web sources, in most cases they do not think about going to the library to ask for assistance to find scholarly sources.

Although students seem to favour search engines, especially Google for their research because of its simplicity compared to library databases and online catalogues, their choice does not always translate to how well they use the search engines. A majority of students have become accustomed to using technology in various formats such as smart phones and computers but studies have shown that familiarity with technology does not always equal information literacy or critical thinking. Rowlands et al. came to several conclusions in their study about the information behaviour of the Google generation⁵. The article, which is an edited report commissioned by the British Library and Jisc (formerly known as the *Joint Information Systems Committee*) aims to provide guidance to library professionals on how to deal with the new and emerging search behaviours of the Google generation. Some themes that emerged from the report were that:

"The information literacy of young people, has not improved with the widening access to technology; Internet research shows that the speed of young people's web searching means that little time is spent in evaluating information, either for relevance, accuracy or authority; Young people have a poor understanding of their information needs and thus find it difficult to develop effective search strategies' As a result, they exhibit a strong preference for expressing themselves in natural language rather than analyzing which key words might be more effective; Faced with a long list of search hits, young people find it difficult to assess the relevance of the materials presented and often print off pages with no more than a perfunctory glance at them".

Several studies have been conducted to gauge student's searching skills, whether they are searching online databases or search engines. One of the studies was conducted by Becker (2003) seeking to understand and enhance student search skills⁶. According to the study, some students encounter problems with searching due to a lack of understanding of information retrieval and organization. Although students were familiar with Boolean

operators, they still failed to apply these skills in a web searching environment. This was also corroborated by Judd and Kennedy in their study of undergraduate medical student's reliance on Google and Wikipedia⁷. The study investigated student's use of five sites including Google and Wikipedia and the usage results were not surprising where Google turned out to be consulted the most. The students, however still did not utilize the advanced search features of any of the sites. Despite instructions from librarians, students still showed a tendency of taking information they find on the internet as authoritative.

The University of Illinois librarians conducted an ethnographic study which became known as the Ethnographic Research in Illinois Academic Libraries (ERIAL) Project. This was a large study carried out from 2008-2010 to investigate how undergraduate students carry out research in five Illinois Universities. Because of the study's ethnographic nature, the researchers yielded rich results as they were able to get actual descriptions of everything students were doing while they were completing their research assignments including the challenges the students faced. Although the students who participated in the study exhibited knowledge of technology use especially after training, they lacked some understanding of the mechanics of searching and how search engines organize information. The study identified a wide array of gaps in student's understanding of what is involved in academic research and they often employ the same strategies they use to search Google for searching library databases⁸.

Do students' information searching behavior change when they are searching library databases compared to searching Google? One study conducted by Georgas tried to answer that question⁹. In the study, the author compared students' searching behaviour when using Google and their library's federated research tool. Students were given a list of topics to choose from and were tasked with finding various types of publications using their library's federated research tool and Google. Although the students in this study ranked their research skills highly, that did not translate to how well they performed their searches and the study revealed the students' lack of understanding of how information is organized and how searches actually work in either Google or a federated research tool. According to this study it looks like the less sophisticated a search tool is, in this case Google, the less sophisticated the search will be as none of the students utilized Google's advanced search options.

A large number of these studies have focused more on undergraduate students and less so on graduate students. Blummer, Watulak, and Kenton seem to support the notion of the scarcity of studies that focus on graduate students as they set out to conduct their own study of education graduate student's information-seeking behaviour¹⁰. The researchers used grounded theory and phenomenography as methods of their study for the purposes of capturing student's perceptions and experiences. The study used as very small sample of seventeen students but the results cannot be ignored. Although participants

in the study indicated some reliance on search engines as their first sources when conducting research, they also consulted library databases. Their patterns of conducting research somewhat differed from that of undergraduate students as they indicated the importance of using an article's reference lists, using professional organization websites, and finding authoritative sources as extremely important.

Catalano conducted a review of the literature for the purposes of finding patterns of behaviour in information seeking by graduate students¹¹. The studies reviewed in this paper revealed patterns of behaviour where a majority of students consult with their faculty member or their supervisor when they begin their research. This is not surprising given the fact that most graduate students work more closely with their faculty or supervisor than a librarian, and undergraduate students have a different level of relationship with their faculty. After consultation with faculty some studies reported that the second source of information will be the internet, however, unlike undergraduate students, this population does not always trust information they find on the internet and tend to trust the library databases afterwards. Not surprisingly, most of the studies reviewed in this article seem to indicate that graduate students are more sophisticated than undergraduate students in their information seeking strategies as some of the students will consult with a librarian for the purposes of finding citations and journal impact factors among other reasons.

Methodology

To gain an insight into how students use Google as a research tool, a questionnaire was developed with a series of questions about the student's use of Google and its advanced features. A questionnaire was chosen as a method to gather information for this study over other methods like interviews as questionnaires ensure anonymity is maintained. Also, by using questionnaires, a wider audience was reached within a short period as the questionnaire was sent to participants through email communication. In addition to a series of questions, students were asked to provide any thoughts they had about their experiences with using Google.

Study participants were randomly selected from an online class list database. A total of 700 undergraduate students and 300 graduate students were selected for the study. About 494 responses were received, and of those responses, about 320 were from undergraduate students, 149 graduate and about 25 of them identified as other and those were mostly from Law School.

The research was also approved by the University's Human Participants Review Committee. The overall population for this study is approximately 50,000 undergraduate students and approximately 6000 graduate students. Both undergraduate and graduate students were included in this study to determine whether there were any differences in their choice and use of

Google and its features based on their level of study. The students were chosen from various disciplines as well to ascertain their disciplinary use of Google.

Results and Discussion

Results: Participants were asked questions related to their use of Google in order to gain an understanding of their searching skills. The first set of questions was about demographics where students were asked to identify their faculty and level of study, whether they were graduate students or undergraduate students. The next set of questions was specific to the students' Google use habits. Almost 100% of graduate students indicated that they use Google on a daily basis while 75% of undergraduates indicated daily use of Google as shown in table 1. 12% of undergraduates use Google a few times a week and 6% indicated they use Google a few times a month.

Table-1
Use of Google in general

How often do you use Google to search for	Graduate	Undergraduate
Frequently, i.e. daily	143	240
A few times a week	00	41
A few times a month	00	20

When participants were asked about their tool of choice when beginning their research project, it was not surprising that Google emerged as a popular resource with 55% of graduate students and 71% of undergraduate students choosing Google as their first resource in table-2. Consulting a librarian first was the least favorable option. For undergraduate students, the library's online resources seem to fare better than Wikipedia.

Table-2
Choice of research tool

When beginning your research for an assignment or project which of these sources does you consult first?	Graduate	Undergraduate
Wikipedia	61	85
Google	83	229
Library's Online resources, e.g. the Online Catalogue, Databases, etc.	60	165
A Librarian	21	24
Friends or Classmates	27	29

In order to gauge student's success with Google, participants were asked if they have ever used Google to find all the information they needed without using the library's resources. In table-3, 73% of graduate students and 39% of undergraduate students were not successful in using Google for finding

information. A majority of undergraduate students (56%) seemed to be satisfied with using only Google at one point in their research to find information without consulting other library resources, compared to 17% of graduate students. This could also depend on the nature of the research assignment at hand where fewer academic sources are required.

Table-3
Use of Google as the only research tool

Have you ever used Google to find all the information you need without using other resources like library databases or the online catalogue?	Graduate	Undergraduate
Yes	26	180
No	110	127

In terms of utilizing other specialized Google tools, it is not surprising that more graduate students (83%) prefer to use Google Scholar than the regular Google search compared to undergraduate students (33%). On the other hand, 81% of undergraduate students prefer to search Google in general compared to 57% of graduate students (table-4). This could be attributed to the fact that graduate students are more advanced and have been exposed to the research process longer than undergraduate students. Google books also seemed to be a less desirable option for both groups likely because the library's online catalogue is less cumbersome to use than online databases.

Table-4
Use of other Google tools

When you decide to use Google to find information for your assignment which of these Google tools do you use?	Graduate	Undergraduate
Regular Google Search	86	260
Google Scholar	124	107
Google Books	61	82

In table-5, very few students expressed lack of confidence about their Google searching capabilities and none of the graduate students expressed that they were not confident at all. As far as undergraduate students are concerned a majority of them (57%) expressed a high level of confidence compared to those who felt somewhat confident (27%).

Table-5
Confidence level in using Google

How confident do you feel about your Google searching capabilities?	Graduate	Undergraduate
Very confident	67	184
Somewhat confident	60	88
Not confident	00	22

As graduate students have indicated that they do not find Google much trustworthy (85%, as indicated in table-6), it is not surprising that 82% of them do actually look at a website's authenticity (table-7). A similar pattern can be seen as well with undergraduate students where 76% of undergraduate students sometimes find information retrieved from Google trustworthy and 82% of them actually look at the website's authenticity. None of the graduate students found this information trustworthy and none of them indicated that they never looked at the website's authenticity.

Table-6
Google and trustworthiness

In general, do you think information retrieved from a Google search is trustworthy?	Graduate	Undergraduate
Trustworthy	00	60
Sometimes trustworthy	128	245

Table-7
Evaluating information found from a Google search

When you use Google for research purposes, do you ever look at the authenticity of the website?	Graduate	Undergraduate
Yes	123	265
No	00	43

A small number (15%) of graduate students have never used any of the advanced features indicated in table-8 while that number is higher for the undergraduate student group (52%). Searching using the exact phrase seems to be the most popular amongst graduate students (73%) who use the advanced search option. Compared to other advanced search features 39% undergraduates utilize the exact phrase option more than other advanced search options. Other advanced search options are less popular with undergraduate students as 29% of them use the "AND, OR" operators and only 20% use the minus (-) and truncation (*) operators. For graduate students the least used operator is the truncation (*) (15%), while over 50% of them use "AND, OR" and the minus (-) operator often.

Table-8
Use of advanced search options

Which of these advanced search options in Google have you ever used?	Graduate	Undergraduate
Exact phrase	110	125
Boolean operators such as AND, OR	83	89
Using a minus (-) sign to eliminate certain terms	85	65
Using an asterisk (*) to fill in the blanks	23	64
None	20	167

Although none of the undergraduate students have used the “create alerts” and “Google Scholar metrics”, that is not surprising given the fact that their research needs are not as advanced as that of graduate students and about 35% of them also indicated that they have never used Google Scholar before (table- 9). A majority of graduate students (58%) have indicated that they have used the option to sort or limit their results by either publication date or relevance, followed by using the “cited by” option and using “settings” to show their Library access links in order to have access to the article’s full-text.

Table-9
Use of Google search features

Which of these search features have you used if you have used Google Scholar before?	Graduate	Undergraduate
Using the "Cited by" from the results list	61	85
Using "Settings" to show your Library access links in order to have access to the article’s full-text	63	69
Using the "Create Alerts" feature	27	00
Sorting or limiting your results by either publication date or relevance	87	81
Using "Google Scholar Metrics" to gauge the importance and influence of certain articles	22	00
None. I have never used Google Scholar before	25	113
I have used Google Scholar but never explored any of these features	20	88

A majority of undergraduate students (83%) in table-10 do not utilize the advanced search options to narrow their search results

and less than 10% narrow their search results using options such as finding pages published in a specific region, narrowing results by file type or domain name, etc. The results seems to show an opposite trend for graduate students where only 19% of them do not narrow their search results. Narrowing the search results by language is popular amongst graduate students with 45% of them using this option compared to about 30% of them using other options.

Table-10
Narrowing a Google search

Which of these search features have you ever used to narrow your search results?	Graduate	Undergraduate
Language	68	21
Finding pages or results published in a particular region	43	27
Finding pages updated within a specific time frame	40	25
Narrow your search by site or domain	47	31
Narrow search by file type	25	20
None	29	268

In table -11, 74% of undergraduate students indicated that they have never used Google Books before and of those who have use Google Books, 20% never explored any of the features available. Google Books also seemed to be less popular with graduate students compared to Google Scholar as 59% of graduate students indicated that they have never use Google Books compared to just 16% who have never used Google Scholar. The most popular feature was the "search within this book", with 57% of graduate students utilizing it.

Table-11
Use of Google Books features

If you ever used Google Books, which of these features have you used	Graduate	Undergraduate
The "Search within this book" feature	86	27
The "Find this book in a library" feature	40	26
None. I have never used Google Books before	88	238
I have used Google Books but never explored any of these features	24	67

At the end of the questionnaire, students were asked to share any comments about their experiences with using Google. Not surprisingly, a majority of those who shared their comments

have positive experiences with Google. Some of the comments from graduate students were:

“Google is very useful for identifying the vast majority of sources in my field. However other online resource are needed to obtain these works”

“I find it a useful tool and much easier to use than most online databases, but I wouldn't ever use it as my sole research tool”

“When working on Scholarly papers I tend to use other resources (e.g. Soc Abstracts, Pubmed, YUL books, etc). But I find Google Books particularly helpful if I only want a portion of the book and don't want to take it out of the library or buy it. Also, I find Google can sometimes find random articles that I probably wouldn't have found through other databases searches”

Some of the comments from undergraduate students were:

“Usually the searches result in a very large number of articles, which I have to review to identify those most relevant”

“As a search engine, Google is excellent at finding a wide array of resources, however, filtering to find the right content and ensuring that it is trustworthy and at an appropriate level for your courses are still left up to the user. In this way using Google for research purposes is in many ways an art form”

“It is awesome”

“I find Google to be a search engine most individuals are most comfortable with using and exploring through”

“It is relatively easy to use and helps a lot as a preliminary search too”

Discussion: Although students expressed confidence when searching Google this does not translate to how successful they are in finding all the information they need without using other resources, like library databases. Despite this expressed confidence, a majority of undergraduate students have indicated that they have never used some of Google's advanced search features and tools like Boolean operators, wild card operators, Google Scholar and its features, Google Books and its features, etc. As more students are learning about the content found on the web, they do not find the content to be all trustworthy although few undergraduate students find it to be trustworthy and do not even bother to scrutinize a site's authenticity. More undergraduate students need to be brought up to speed about what Google can offer. Most students are more tech savvy and this leads them to falsely believe their information literacy skills are at par with their technology skills. Google's simple interface could also be a contributing factor to student's lack of searching skills. This, in turn poses a problem when students need to do research for academic purposes especially if Google was their first tool for finding information. They expect their library

databases to function the same way that Google does thus place more importance to recall rather than relevance.

Although graduate students, seem to be savvier about research than their undergraduate counterparts, more could be done to bring them up to speed with less obvious tools that might be useful for their research. Some of those tools include “Google Scholar Metris”, the “Cited By”, “Creating Alerts”, using truncation or wild card symbols, etc. They seem to know how to apply the same searching techniques one would use when searching academic databases, like using Boolean operators such as AND/OR while searching Google.

Conclusion

Google presents a great opportunity for librarians to teach students what they need to know about information organization. Librarians cannot shy away from the fact that Google provides an easier platform to navigate for students. Teaching information literacy skills has become more relevant than ever. Although students manage to find some relevant information when they search Google, the process can be time consuming as they have to sift through the many search results they retrieve. Librarians can use this opportunity to highlight specific Google tools and search features to help students search more effectively. Librarians also have the perfect opportunity to teach students when it is best to use Google and when it is best to use the libraries online catalogues and databases. For instance, when students are looking for discipline specific resources it might be best for them to use discipline specific databases instead of Google Scholar which might take them in different directions, as one student mentioned that they have to sift through Google's search results to find the right content.

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