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Web search behavior of university students: a case study at University of the Punjab

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Abstract

The World Wide Web is now known to be the richest source of information. The growth rate of the web is exponential. This paper explores different aspects of web search behavior of university students, in terms of user's background and experience with web, purpose of use, searching skills, query formulation, frequency of use, favorite search engine, etc. All these factors contribute to the way in which the students search the web. Data have been collected from students of the Faculty of Economics and Management Sciences, University of the Punjab, Lahore through questionnaire. Key findings include the use of web for academic tasks, preference of Google, reformulation of query, use of basic and advance search features, browsing of first ten hits and problem of slow speed.

Keywords

Web searching; Web information retrieval; Web search behavior; Search engines; Universities; Pakistan

Introduction

Information and communication technology (ICT) has revolutionized every walk of human society. Large scale computerization, invention of internet and influx of World Wide Web (or just the Web) has made extensive and fast dissemination of information and turned the world in a global village. Initially the Web was developed at CERN (Geneva) by Tim Berners-Lee and became almost a synonym for Internet itself ([Poulter, 2003](#)). In fact, the two terms are not synonymous; both are separate but related things. The Internet is a massive network of networks, while the Web is a way of accessing information over the medium of the Internet by using the HTTP protocol, only one of the languages spoken over the Internet. It interfaces other Internet services. The Web also utilizes browsers, such as Internet Explorer or Firefox, to access web documents called web pages that are linked

to each other via hyperlinks. Simply, it can be said that the Web is just a portion of the Internet. With its short history of approximately 15 years it has become a major area of interest as millions of people all around the world use the Web for their daily life needs.

In Pakistan, the use of Internet has been accelerated and Government has taken special steps to promote its use in education sector. The University of the Punjab (PU) is the oldest and largest university in Pakistan. Faculty of Economics and Management Sciences is one of its 13 faculties. This faculty comprises two departments; Economics, Library and Information Science (LIS) and three institutes; Institute of Administrative Sciences (IAS), Institute of Business Administration (IBA) and Institute of Business and Information Technology (IBIT).

Aims of the Study

The present study is an attempt to find out the pattern of web searching by the PU Faculty of Economics and Management students. The study was conducted with the following objectives:

- To identify the purposes for which the Web is used by the students under study;
- To identify if there are different levels of sophistication when performing web searching task;
- To know the satisfaction level of the students with the information retrieved through the Web; and
- To trace out the problems faced while using the Web.

Methods

To explore the phenomenon of web search behavior, a survey was conducted of PU students of Faculty of Economics and Management Sciences. Data were collected through questionnaire. Total number of population was approximately 3100 and targeted sample was 200. Proportional quota sampling method was used as 62 questionnaires were completed from IBA and IAS each (approximately, 2000 total number of students), 34 from IBIT (600), 24 from Economics (300), 18 from LIS (200).

Literature Review

The Internet has become one of the most important and integral information sources for human lives and work. As the use of Internet is accelerated, the information environment is becoming more complex. To resolve the complexities of Internet users, researchers have endeavored to understand how people search for information on the Web, for the purpose of designing better search tools and better ways to organize information for retrieval and access. Studies on web search behavior appeared as early as 1995 and have proliferated since ([Hsieh-Yee, 2001](#)). A review of the literature reveals that researchers have identified different aspects of user's web search behavior, in terms of user's background and experience with computers, and web, domain knowledge, cognitive abilities, information strategies, nature of search task, query formulation, systems capabilities, demographics, environment etc. All these factors contribute to the way in which the searchers search the Web. [Hsieh-Yee \(2001\)](#) shares the views that many studies in published literature did not analyze web search behavior directly but sought to understand who searched the Web, what tasks they performed, what their perception was of web search tools, and how they searched. He conducted a research in 2001 that shows the trends of research on the phenomenon of web search behavior during the period of 1995 to 2000. He mentioned that according to the Search Engine Index, Internet users ranked searching as the most important activity, giving it a 9.1 on a 10-point scale. The index also indicated 57% of

Internet users search the Web each day and searching was reported to be the second most popular activity, after e-mail.

An informative review of web searching studies by [Jansen and Pooch](#) (2001) compares the searching characteristics of web users with those of users of traditional IR systems. They found differences in the behavior of the two categories of searchers in using terms per query, searching session length and use of Boolean operators or advance search features. One of the most comprehensive attempts to understand web search behavior has been made by [Spink and Jansen](#) (2004), who analyzed query logs of the Excite, Alta Vista, Ask Jeeves, and AlltheWeb.com search engines from 1997 to 2003. They discussed the change and explore how people search the Web by analyzing the trends of web search in terms of search queries length, format, reformulation of query, use of advance search and search session length. A study of web search behavior of 16 selected libraries of Ahmedabad and Gandhinagar conducted through a survey that revealed the satisfaction level of the LIS professionals with the type of information sought through search engines. The findings indicated the LIS professional dependency on the search engines and the familiarity of the advanced search options available in the search engines ([Batthini & Madnani](#), 2003).

Beyond general studies of web users, a number of studies have focused on the student population. Today the Web and ICT is imbedded in students' lives. They use it daily for communication, entertainment, socializing, shopping, and learning ([Lenhart, Madden & Hitlin](#), 2005). Many studies have been conducted to investigate the Web search behavior of university students. [Aitken](#) (2007) is of the view that the role of the Web and ICT in tertiary education and research is expanding and changing. [Chang and Perng](#) (2001) carried out a research work on "Information search habits of graduate students at Tatung University." The purpose of their study was to investigate the information requirements and search habits of graduate students at Tatung University in Taipei City, Taiwan. They reported the extensive use of Internet by the students in the recent past, mostly web-based databases, electronic journals, and search engines.

[Ebersole](#) (2005) reviews the research conducted in 1998-99 examining students' perceptions and uses of the Web for academic purposes. The results of the content analysis of sites visited by students suggest that students believe the Web to be an important and valuable resource. [Navarro-Prieto, Scaife and Rogers](#) (1999) sought to develop an empirically based model of web searching in which 23 students were recruited from the School of Cognitive and Computer Science at the University of Sussex. From their research they were able to identify three different general patterns of web searching: 1.Top-down strategy, 2.Bottom-up strategy, 3.Mixed strategies. They compared web searchers with high and low experience and concluded that expert searchers plan ahead in their searching behavior based on their knowledge about the Web, while novice searchers hardly plan at all. [Holscher and Strube](#) (2000) also admitted that searching for relevant information on the Web is often a laborious and frustrating task for casual (newbies) and experienced users. [Cmor and Lippold](#) (2001) put forward a number of observations from their experiences of student searching behavior on the Web. Their findings can be summarized as follows: (1) students use the Web for everything; (2) they may spend hours on searching or just a few minutes; (3) students searching skills vary. [Zhang, Anghelescu and Yuan](#) (2005) conducted an exploratory study of engineering and science students to find out that how domain knowledge affects user's search behavior, and search effectiveness. The study concludes that the level of domain knowledge seems to have an effect on search behavior (as this level increases, the user tends to do more searches and to use more terms in queries) but not on search effectiveness. Another study conducted by [Nicholas et al.](#) (2008) provides evidence on the actual information-seeking behavior of students in a digital scholarly environment by gathering data of CIBER's ongoing Virtual Scholar programme. In particular log data from two digital journals libraries (Blackwell

Synergy and OhioLINK), and one e-book collection (Oxford Scholarship Online) were also utilized for conducting research. The findings suggest that students constituted the biggest users in terms of sessions and pages viewed, and they were more likely to undertake longer online sessions. Undergraduates and postgraduates were the most likely users of library links to access scholarly databases, suggesting an important "hot link" role for libraries.

Above mentioned studies indicate that a large body of foreign literature focuses on how users search the Web and shed light on several factors related to web search behavior. This type of research has a relatively short history (about five years), but has covered many aspects web search behavior.

In Pakistan, Internet came in 1995 and a dramatic growth in its use has been witnessed during recent years. A review of the local literature reveals that ample number of studies has been conducted on the use of Internet that partially address the web search behavior in terms of the use of search engine and HEC Digital Library ([Bashir, Mahmood & Shafique, 2008](#); [Ullah, 2007](#); [Safdar, 2008](#); [Warraich & Ameen, 2008](#)). However, no study has been conducted to explore the students' web searching behavior. So this study is an attempt to fill the gap in this respect.

Analysis and Interpretation

Respondents' profile

According to collected data, 112 respondents (56%) were female while 88 (44%) were male. The respondents were from different programs of study offered in the institutes and departments included in the study. A small number of students were from MPhil/PhD programs offered by IAS, Department of LIS and Department of Economics. Fifty (25%) students were from undergraduate programs offered by IBIT, IAS and IBA. The large majority of respondents (143, 71.5%) belonged to master programs offered by all five departments/institutes (Table 1).

Table 1. Respondents' program of study

Program of study	Frequency	Percent
Undergraduate	50	25.0
Master	143	71.5
MPhil/PhD	7	3.5
Total	200	100.0

Web searching experience

The students were asked to mention the period, since they had been using the Web. The responses varied from up to one year to eight years. The analysis (Table 2) shows that 34 students had up to one year web searching experience, while 47 had more than five years experience. Majority of the students' web using experience rests in the period of 2 to 5 years.

Table 2. Respondents' experience as web user

	Frequency	Percent
Up to one year	34	17.0
2-3 years	65	32.5
4-5 years	54	27.0
More than 5 years	47	23.5

Total	200	100.0
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Location of web use

The analysis reveals that majority of the students (119) searched the Web at their homes. Fifty (25%) students searched the Web at university while only one student has mentioned that he used the Web at his office. Thirty (15%) students searched it both at home and university (Table 3).

Table 3. Location of web use

	Frequency	Percent
Home	119	59.5
University	50	25.0
Both	30	15.0
Any other	1	0.5
Total	200	100.0

Frequency of web search

The respondents were asked to mention how often they used the Web. The results reveal that frequency of web searching is good enough among students as 62 (31%) students used it once a day, 27 (13.5%) used it twice a day, whereas 46 (23%) used it more than twice a day. This means that more than 65 percent students used it regularly (Table 4).

Table 4. Frequency of web use

Frequency of web search	Frequency	Percent
Occasionally	15	7.5
Once a month	4	2.0
Twice a month	7	3.5
Once a week	13	6.5
Twice a week	26	13.0
Once a day	62	31.0
Twice a day	27	13.5
More often	46	23.0
Total	200	100.0

Purpose of web searching

The main objective of this question was to find out the purpose of searching web. The analysis indicates that large number of students searched the Web for their academic tasks as 145 (72.5%) respondents used it for research and 153 (76.5%) for education. This finding nullifies the general public notion regarding wrong use of the Web. Research conducted in developed countries also have found that students believe the Web to be a valuable resource for educational activities and use it for the purpose of research and learning (Ebersole, 2005; Griffiths & Brophy, 2005). Although leisure and entertainment (68%) is also reported, however main focus is on academic tasks. Table 5 also shows some sports and shopping related purposes as well.

Table 5. Purpose of web searching

	Frequency	Percent

Research	145	72.5
Education	153	76.5
Entertainment	136	68.0
Sports	37	18.5
Shopping	12	6.0

Purchasing of web related material

Students were asked whether they buy web related books or magazines. Only 23 (11.5%) provided positive response as they buy web related material whereas 177 (88.5%) provided negative response.

Favorite search engine

To solve the problem of discovering web resources, search engines have been developed that can provide the users with a large body of results by a click. Research suggests that web users often start with a search engine when looking for specific information, and in a survey 56.3 percent of respondents said that they used a search engine at least once a day ([Ebersole, 2005](#)). Internet search engines domination in students' information-seeking strategy indicates that the behavior of web researchers follow the law of least effort (minimum effort and time) as number of studies ([Johnson, Griffiths & Hartley, 2001](#)) support this as well. [Griffiths and Brophy](#) (2005) reported the results of two user studies that focus on students searching behavior. The students preferred to locate information via a search engine above all other options, and Google was the search engine of choice. Forty-five percent of students used Google as their first port of call when locating information.

The present study also explored this aspect as the students were asked to mention which two search engines were the most favorite to get required information. Results presented in Table 6 show that popularity of search engines among students correspond to the global ratings. Google was the most favorite search engine followed by Yahoo as 97% respondents declare Google and 72% mentioned Yahoo all the time favorite. Others include MSN and Alta Vista. [Bashir, Mahmood and Shafique](#) (2008) also reported the same type of rating trend among PU students.

Table 6. Favorite search engine

Name	Frequency	Percent
Google	194	97
Yahoo	143	72
Others	37	18

Features of search engines

Search engines have several distinct features that make the information retrieval process easy and speedy. Students were asked to mention the features that attract and appeal them to use search engine while locating required information. The results (Table 8) reveal that the features most liked by students were ease in use (144, 72%), relevant search results (120, 60%), reliability (113, 56%) and speed (107, (53.5%)). [Griffiths and Brophy](#) (2005) reported the result of a web search study that 50 percent found it easy to locate the required information on a search engine. It is matter of concern that the Web and Internet is famous for their currency of material whereas the students have ranked it as the lowest feature in present study.

Table 7. Appealing features of search engines

Features of search engine	Frequency	Percent
Ease of use	144	72.0
Relevancy	120	60.0
Reliability	113	56.5
Speed	107	53.5
Accuracy	98	49.0
Familiarity	91	45.5
Easy interface	71	35.5
Language	73	36.5
Durability	32	16.0
Currency	25	12.5

Sources used in acquiring relevant information on the Web

The students were asked to state which sources they used in finding relevant information on the Web by using five point semantic differential scale. The results indicated that to some extent students used reference URLs acquired teachers, friends and family and search history respectively (Table 8).

Table 8. Sources used in acquiring relevant information on the Web

	Mean	SD
Reference URLs from teachers, friends	2.98	1.387
Search history	2.86	1.394
Media	2.44	1.176

Note: 1=Rarely----5=Often

Searching skills

The purpose of this question was to identify if there are different levels of sophistication when performing web searching tasks. The analysis reveals that students frequently used basic search features (Mean=3.86). However, the students used advance search to moderate extent (Mean=3.11) whereas little trend of browsing web directory has been noticed (Table 9). Query formulation, number of queries, terms used in query are essential part of successful information retrieval and indicates the searching behavior of different people varying in their levels of expertise, experience in using computers, the Web, and search engines (Aula, 2003). To explore this aspect, students were asked if they make use of more than one query. The respondents provided data demonstrates that students frequently made use of more than one query (Mean=3.43).

Table 9. Searching skills

	Mean	SD
Basic search	3.86	1.255
Advance search	3.11	1.224
Web directory	2.57	1.332
Query	3.43	1.128

Note: 1=Rarely----5=Often

Browsing hits

Different studies of the use of web found that almost all users look at the first page of results only. Most users are satisfied that these initial ten or so results are good enough to answer their information need ([Craven & Griffiths, 2002](#); [Sullivan, 1998, 2002](#)). Again the results of this study (Table 10) correspond to global trends as most of the students (112, 56%) generally browsed through first ten results. Fifty three (26.5%) students marked the second option (20 hits) (Table 11).

Table 10. Browsing hits

	Frequency	Percent
10 hits	112	56.0
20	53	26.5
30	19	9.5
40	12	6.0
50	2	1.0
More than 50	2	1.0
Total	200	100.0

Table 11. Criteria of judging relevancy of information

	Mean	SD
Title	3.86	1.315
Highlighted words	3.46	1.155
Descriptions	3.35	1.168
URLs	2.46	1.219

Note: 1=Rarely----5=Often

Relevancy of results

The World Wide Web contains tremendous amount of information, however it should be admitted that the problem of discovering the relevant resources has become intense, as the quantity of its information grows, people's ability of finding relevant materials has decreased dramatically as [Safari \(2005\)](#) called it "a needle in the haystack." The students were asked whether they usually found the required information on the Web. The results state that to moderate extent they usually found the requiring information (Mean=3.74). They were also inquired about their relevancy judging criteria. The responses demonstrate that students usually identified the relevancy by title (Mean=3.86) and highlighted words (Mean=3.46). Descriptions (Mean=3.35) and reading URLs (Mean=2.46) were little used (Table 11).

Level of satisfaction about information retrieved through the Web

To identify the level of satisfaction about the information retrieved through the Web, a five point semantic differential scales was used. Descriptive statistics show that majority of the students were satisfied to moderate extent with the retrieved information (Mean=3.97, SD=0.826).

Problems in searching the Web

The respondents were asked about their problems while searching the Web. To obtain the respondents' opinion five point Likert scale was used. Descriptive statistics of students' problems (Table 12) show that the problem of poor quality was little extent (Mean=3.43).

However, students faced the difficulty in finding relevant information, problem of too much information and slow speed to moderate extent.

Table 12. Problems in web searching

Problems	Mean	SD
Poor quality	3.43	1.154
Irrelevant information	2.81	1.199
Overload of information	2.74	1.171
Slow speed	2.69	1.426

Note: 1=To great extent, 2=To moderate extent, 3=Undecided, 4=To little extent, 5=Not at all

Conclusion

Since its birth in 1991, the Web has become a complex and very large repository of documents in the form of hyperlinked web pages. The present study has presented an analysis of the students' web search behavior. The picture painted by the findings corresponds with global trends. Students use the Web for everything and especially for academic tasks, prefer particular favorite search engines, though the reasons they give for their preferences are common across almost all search engines. They usually perform basic search and satisfied with retrieved information.

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