Web Search Behavior of University Students: A Case Study of the 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 a 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.

I. 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 (commonly abbreviated as the "Web") have facilitated extensive and timely dissemination of information and turned the world into a global village. Initially, the Web was developed at CERN (European Organization for Nuclear Research) by Tim Berners-Lee and has since become almost a synonym for the Internet itself (Poulter, 2003). In fact, the two terms are not synonymous. The two 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 the 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. The Faculty of Economics and Management Sciences (FEMS) is one of its 13 faculties. This faculty comprises two departments (Department of Economics and Department of Library and Information Science) and three institutes (Institute of Administrative Sciences, Institute of Business Administration, and Institute of Business and Information Technology).

II. 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 use, researchers have endeavored to understand how people search for information on the Web in order to design 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 users' Web search behavior in terms of their 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 users 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. She conducted a study in 2001 that shows the trends of research on the phenomenon of Web search behavior during the period of 1995 to 2000. Hsieh-Yee mentioned that according to the Search Engine Index, the Internet users ranked searching as the most important activity, giving it a 9.1 on a 10-point scale. The Index also indicated that 57% of the Internet users search the Web each day and that searching was reported to be the second most popular activity, right behind e-mail.

An informative review on Web searching studies by Jansen and Pooch (2001) compares the searching characteristics of Web users with those of users of traditional information retrieval (IR) systems. They found the 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 search engines of Excite, Alta Vista, Ask Jeeves, and AlltheWeb.com from 1997 to 2003. They discuss the changes 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 in Ahmedabad and Gandhinagar, conducted through a survey, reveals the satisfaction level of the LIS (library and information science) professionals with the type of information sought through search engines. The findings indicate the dependency of LIS professionals 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 are embedded in students' lives. They use the Web 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 the Internet by the students in the recent past, mostly about Web-based databases, electronic journals, and search engines.

Ebersole (2005) reviewed 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, for 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, and (3) Mixed strategies. They compared Web searchers with high and low experiences 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.

Hölscher and Strube (2000) acknowledged that searching for relevant information on the Web is often a laborious and frustrating task for newbies and experienced users.

Cmor and Lippold (2001) noted a number of observations 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, and (3) students searching skills vary.

Zhang, Anghelescu, and Yuan (2005) conducted an exploratory study of engineering and science students to see how domain knowledge affects users' search behavior and search effectiveness. Their study concludes that the level of domain knowledge seems to have an effect on search behavior (that is, as this level increases, the user tends to do more searches and to use more terms in queries) but not on search effectiveness.

These studies indicate that a large body of literature focuses on how users search the Web and sheds light on several factors related to Web search behavior. This type of research has a relatively short history but has covered many aspects of Web search behavior.

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

III. Objectives 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 Sciences 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 ascertain if there are different levels of sophistication when the students perform Web searching tasks.
- To know the satisfaction level of the students with the information retrieved through the Web.
- To trace the problems faced by the students while using the Web.

IV. 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 a questionnaire. The total number of survey population was approximately 3,100. And the targeted sample was 200. A proportional quota sampling method was used.

62 fulfilled questionnaires were returned from Institute of Business Administration (IBA) and Institute of Administrative Sciences (IAS) respectively (out of an approximately combined total of 2,000 students), 34 out of 600 from Institute of

Business and Information Technology (IBIT), 24 out of 300 from Department of Economics, 18 out of 200 from Department of Library and Information Science (LIS).

V. Analysis and Interpretation

1. Respondents' program of study

According to the 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 M.Phil/PhD programs offered by IAS, LIS, and Department of Economics. Fifty (25%) students were from undergraduate programs offered by IBIT, IAS and IBA. The majority of respondents (143, 71.5%) belonged to master programs offered by all five departments and institutes (Table 1).

Table 1: Respondents' program of study

Program of study	No. of Students	Percent
Undergraduate	50	25.0
Master	143	71.5
M.Phil/PhD	7	3.5
Total:	200	100.0

2. Web searching experience

The students were asked to indicate how long they had been using the Web. The responses varied from 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. The majority of the students' Web using experience rests in a period of 2 to 5 years.

Table 2: Web searching experience

Period	No. of Students	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

3. Location of Web use

The analysis reveals that the majority of the students (119, 59.5%) searched the Web at home. 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

Location	No. of Students	Percent
Home	119	59.5
University	50	25.0
Both	30	15.0
Other	1	0.5
Total:	200	100.0

4. Frequency of Web search

The respondents were asked to mention how often they used the Web. The results reveal that the 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, and 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 search

Frequency	No. of Students	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

5. Purpose of Web searching

The main objective of this question was to find out the purpose of searching the Web. The analysis indicates that a 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 the wrong use of the Web. Research conducted in developed countries has also 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 (136, 68%) is also reported, the main focus, however, is on academic tasks. Table 5 also shows some sports and shopping related purposes as well.

Table 5: Purpose of Web searching

Purpose	No. of Students	Percent
Research	145	72.5
Education	153	76.5
Entertainment	136	68.0
Sports	37	18.5
Shopping	12	6.0

6. Purchasing of Web-related materials

The students were asked whether they buy Web-related books or magazines. Only 23 (11.5%) provided a positive response whereas 177 (88.5%) provided a negative response.

Table 6: Purchasing of Web-related materials

Purchasing	No. of Students	Percent
Yes	23	11.5
No	177	88.5
Total:	200	100.0

7. Favorite search engine

The students were asked to mention which two search engines were the most favorite to get information needed. The results presented in the Table 7 show that the popularity of search engines among students correspond to the global ratings. Google was the most favorite search engine, followed by Yahoo as 97% respondents declared Google and 72% mentioned Yahoo as their favorite. Others include MSN and Alta Vista. Bashir, Mahmood, and Shafique (2008) also reported the same type of rating trend among PU students.

Table 7: Favorite search engine

Search Engine	No. of Students	Percent
Google	194	97
Yahoo	143	72
Others	37	18

8. Appealing features of search engines

Search engines have distinct features that make the information retrieval process easy and speedy. Students were asked to mention the features of search engines that attract and appeal to them when locating information on the Web. The results (Table 8) reveal that the features liked most by students were ease of use (144, 72%), relevant search results (120, 60%), reliability (113, 56%), and speed (107, (53.5%).

Table 8: Appealing features of search engines

Features	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

9. 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 a five-point semantic differential scale. The results indicated that to some extent, students used URLs provided by teachers, friends and family and search history respectively (Table 9).

Table 9: Sources used in acquiring information on the Web

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

Note: 1=Rarely 5=Often

10. 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 did use advance search to some moderate extent (Mean=3.11) whereas little trend of browsing Web directory has been noticed (Table 10). Query formulation, number of queries, and terms used in query are essential parts of a successful information retrieval and indicate the searching behavior of different people in accordance with their levels of expertise, experience in using computers, Web, and Web search engines (Aula, 2003). To explore this aspect, students were asked if they make use of more than one query. The data provided by the respondents demonstrates that the students frequently made use of more than one query (Mean=3.43).

Table 10: Searching skills

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

11. Browsing hits

Various 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 11) correspond to the global trend as most of the students (112, 56%) generally browsed through first ten results. Fifty-three (26.5%) students browsed 20 hit results.

Table 11: Browsing hits

Hits	No. of Students	Percent
10	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

12. Relevancy of results

As the quantity of information on the Web grows exponentially, people's ability of finding relevant materials has decreased dramatically. Safari (2005) called it "a needle in the haystack." The students were asked whether they usually found the relevant information on the Web. The results state that to some moderate extent, they usually found what they need (Mean=3.74). They were also inquired about their criteria to judge relevancy. 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 less used (Table 12).

Table 12: Criteria of judging relevancy of information

Criteria	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

13. Levels of satisfaction about information retrieved through Web

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

Table 13: Levels of satisfaction

Level	Mean	SD
Satisfaction	3.97	0.826

Note: 1=Rarely 5=Often

14. Problems in searching Web

The respondents were asked about their problems with Web searching. To obtain the respondents' opinions, a five-point Likert scale was used. Descriptive statistics (Table 14) show that the problem of poor quality of Web searching was not of much concern (Mean=3.43). However, they found it difficult to locate relevant information, with too much information and slow retrieval speed.

Table 14: 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

VI. Conclusion

Since its creation in 1989, the Web has become a complex and vast repository of documents in the form of hyperlinked Web pages. The present study has presented an analysis of Web search behavior of the students at the University of the Punjab, Pakistan. The picture painted by the findings corresponds with that of the world. Students use the Web for everything, especially for academic tasks. They have preferred search engines, although their preferences are based on features commonly available across almost all search engines. They usually perform basic search and are satisfied with the retrieved information.

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