THE NET AS RESEARCH TOOL - AN ANALYSIS OF THE INTERNET SEARCH ENGINES USE: IMPLICATIONS FOR INFORMATION LITERACY IN PRIVATE HIGHER EDUCATION

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ABSTRACT

This study reports the use of Internet search engines as an information and research tools among business undergraduates at a private university in Malaysia. It attempts to investigate students web searching behavior in using the Internet as an information seeking and searching tools via the commercial search engine in academic learning. The study compares the statistical differences on years of computer technology experiences, levels of study and gender with the types of Internet search engines. A total of 361 respondents from 3 levels of study; year 1, 2 and 3 consisting of undergraduate students from three business courses participated in this research. The extent and pattern of Internet search engines use in searching information for research were examined on the relationships between the following independent variables: years of computer technology experiences, levels of study and gender with the dependent variables of three Internet search engines, namely Google, Yahoo and MSN, as research tools. Hypotheses tests were conducted to examine if mean scores were significant using one-way ANOVA and independent sample t-test. Differences were observed in the case of gender with all the three search engines. As for years of computer technology experiences, significant difference was observed only for Goggle. The post hoc test conducted shows a significant difference in the search engines use between respondents reported with less than 2 years of computer technology experience and those who have more that two years of technology experience. The mean score results suggested that those who have more experience using computer technology tend to use Google more often as a research tool compared to students who have less than 2 years of computer experience. In the case of levels of study, no significant differences were observed among the three types of search engines. The results provide insight into business students use of the Internet search engines in information seeking for research activities in their undergraduates course studies. The findings of this study have its implications for information literacy initiatives in higher education in Malaysia. The importance of disseminating information skills to students through various concerted efforts and approaches between the management, information professionals and the faculty to inculcate the ability to recognize, find, and discerning the quality of information retrieved from the Internet are discussed.

Keywords: Undergraduates in Business; Internet search engines; Gender; Information literacy; Higher education

INTRODUCTION

The World Wide Web (WWW) has predominantly linked most people in their daily computing experience (Cockburn &McKenzie 2001) with the innovative invention of the web browser. Relatively, the Internet has dramatically changed human communication and information seeking (Savolainen 1999). The electronic networked conveniences are influencing the university students' information behavior in their learning process, and accordingly impact on information literacy efforts (O'Brien & Symons 2005). This global phenomenon motivates stakeholders and academic librarians in institutions of higher learning to research users' information searching practices. The aim is to provide effective generic learning skills to synchronize with the new learning environment. Ping (2002) suggested that information literacy is an essential component that could help

individuals achieves competencies to meet the needs of evolving information society, especially students to use information effectively and efficiently. Bruce (2004) described information literacy as a catalyst for educational change, an overarching literacy essential for Twenty-first Century living, and an educational means to transform information society into a learning society.

Under the initiative of Information Literacy programs at Malaysian public universities, M. Sharif and Zainab (2002) suggested that academic libraries information searching programmes have extended beyond user education for participants study and research needs. Juxtapose to such development, it is observed that academic libraries users behavioral studies in Malaysia proliferated. Many studies have been conducted locally on information needs and seeking behaviors of different user groups including students of different levels, academics, and professionals by Malaysian public universities. In a citation study of 40 dissertations (2000-2004) of Master in Library and Information Science Program at University Malaya, Yeap and Kaur (2007) reported the study of 15 subjects in the distribution of research of cited document in the citing dissertation works. It was found that the subject of 'Information use, need, seeking' was ranked on top of the 15 subjects list with the highest cited documents of 675 (21.12%) citations (n=3206). Comparatively, User Studies culled 173 (5.4%) citations. The surrogated information reflects a predominant trend in local studies contents on the search dimensions of information literacy assessment of a learning skill in locating the needed information.

Nevertheless, the emergence of new information communication technology (ICT) such as the Internet has become one of the most important information tools among faculty and students in the university (Bao 1998). In this respect, Stapleton (2003) argued that the Internet has in the past several years become an acceptable supplementary source for academic research, or even an alternative research tool. Despite the fact that there were 43,490 undergraduates admitted to Private Institutions of Higher Learning in 2006 (Malaysia Ministry of Higher Education 2007), anecdotal evidence suggests that the study of tertiary level students' information habits in their academic pursuits is lacking in private colleges and universities in Malaysia compared to public universities. Therefore, it is thus timely to conduct research looking at a different entity of information consumers at the Private Higher Education Institutions (PHEIs) in Malaysia. The study aims to contribute to the encompassing information literacy initiative in Malaysia.

For the purpose of this research, the researchers adhere to information literacy as defined by the American Library Association (1989) that the information-literate person as one who "must be able to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information". According to Berghel (1997), an Internet search engine consist of an HTML form-based interface that is used in submitting a query to the index with network indexer (spiders, wanderers, crawlers, worms, ants and robots) that visits a specific set of network servers periodically and returned file or data for inclusion in the indexed database.

In the nutshell, this study attempts to investigate information behavior of business undergraduates in a private university in Malaysia in their usage of the Internet as information seeking and retrieval tools via the commercial search engines. It examines the frequency use of the Internet search engines to obtain information for students research. The study compares the statistical differences on years of computer technology experiences, levels of study and gender with the types of Internet search

engines (namely Google, Yahoo and MSN) among three business majors students in conducting research for their academic learning.

LITERATURE REVIEW

The web Search Engine Watch (Burns 2007) based on Nielsen//NetRatings has reported the top 10 search providers of the Web by internet users. Based on the survey, Google, Yahoo and MSN/Windows Live have been ranked among the top three in a top-ten providers' list. The popularity of the Internet as communication and searching tool for information among students has been documented in published reports (Nie & Erbring 2000; Pew Internet & American Life Project 2002). The concerns on the predominance use of search engines in locating information for learning at tertiary levels had invited many studies conducted on higher education students' use of the Net.

In a study conducted by Yi (2007) among international students (n=61) at Texas Woman's University, it was reported the top three most commonly used search engines by the respondents were Google (88.5%), Yahoo (65.6%) and MSN (18%). In an attempt to distinguish library systems and the popular internet search engine, Google, Brophy and Bawden (2005) compared Google with appropriate library databases and system to assess the relative value of the two sort systems. The study reported both systems have their respective strengths and weaknesses. It was found that Google is superior in accessibility and coverage, but the library systems excel in quality of results. The authors suggest improving the information skills of the searchers to give better results from the library systems, but not for Google.

Ward and Ostrom (2003) suggested that the internet as information minefield is changing the traditional assumptions about the practice of mass marketing and consumer behavior in the e-commerce environment. The contemporary information age and the innovations of Information Communication Technologies (ICTs) allow the ease in dissemination information on the World Wide Web. As consumers turn to the Internet to seek product and services information and emanated sources to make decisions, the nature of business undergraduates studies to keep abreast with business information available at the Internet in completing their course assignments may conditionally influencing their preferred information habits in conducting academic research projects. Moreover, the ease of searching for information on the net for diverse subjects with a variety of formats has often being perceived as a convenient research tool for colleges and universities students. Many researchers expressed concerns on the information habits having distinctive influence over the quality of students work in academics activities on assignments, research papers and students' projects (Kunkel, Weaver & Cook 1996; Rothernberg 1997; Thompson 2003).

It is obvious that the Internet continues to affect undergraduates research habits with convenient array of online research tools. Robinson and Schlegl (2005) evaluated the scholarly content of student citations in a political science course and tested two designed interventions intended to improve the quality of students' works. The study suggested the instructors might encourage students to improve the quality of their research by providing guidelines included in the instruction-and-penalty on students assignments. Herring (2001) recommended that academic librarian professionals be proactive in working with the teaching faculty to develop course-related training to enable students find web-based information and to effectively evaluate its quality, authority and credibility. Other pragmatic approach suggested by other researchers was

integrating information management skills into business studies curriculum (Burger & Schmidt 1987). Hepworth (1999) viewed that information skills need to be supported and inculcated throughout the undergraduates' leaning process instead of 'one-off' exercises, and "traditional approach to bibliographic instructions and library tour provided a limited contribution" to this process. The author recommended and proposed to incorporate the imparting of information literacy skills in the curriculum through staged approach. In a different approach, Weber and Johnston (2000) adopted action research methodology with a one-semester credit-bearing class in information literacy undertaken by business students at the University of Strathclyde to engage students by teaching and learning in the subject discipline.

Jayne and Meer (1997) advocated that the academic libraries must change the services offered in view of technological advances. The author suggests a collaborative program with faculty and computing centre personnel to deliver effective service on using WWW as teaching tools. Griffiths and Brophy (2005) reported that commercial Internet search engines were the dominant method employed by students in information seeking. It was found that 45% of students prefered to use Google as their first port of call when locating information in the university library catalogue which is used by 10% of the sample in some of the related studies on Information Environment (IE) conducted at Manchester Metropolitan University and Lancaster University.

In the Malaysian context, M Sharif and Zainab (2004) conducted a survey on the use of library related sources of information in the initial stages of the research project at the Faculty of Computer Science and Information Technology, University Malaya among 360 final year undergraduates. It was found that 98.2% (n=325) indicated the intensity of using the Internet as a source to obtain information. In part of the study reported, Google was indicated as the preferred search engine among 14 informants interviewed. The reason given was that the informants had been exposed to using these search engines in one of their courses. Using citation analysis of bibliographies of 73 final year project reports from the Faculty of Computer Science and Information Technology, University of Malaya, Edzan (2007) found that there were more web citations than citations on books, journal articles, undergraduates reports, Master's dissertations and conference papers. Even though both studies involved the same faculty conducted in different years, the predominant behavior of internet use and web citations by computers and IT students does reflect pre-existing computer skills and experiences influence the information use behaviors of the students in producing their academic research projects.

RESEARCH HYPOTHESES

Based on the previously reviewed theoretical and empirical literatures, the following hypotheses were proposed:

(a) Years of computer technology experience and use of Internet search engines

Ho: There is no significant difference between years of computer technology experience in how often they use Google Internet search engines for research.

H1: There is a significant difference between years of computer technology experience in how often they use Google Internet search engines for research.

Ho: There is no significant difference between years of computer technology experience in how often they use Yahoo Internet search engines for research.

H2: There is a significant difference between years of computer technology experience in how often they use Yahoo Internet search engines for research.
Ho: There is no significant difference between years of computer technology experience in how often they use MSN Internet search engines for research.
H3: There is a significant difference between years of computer technology experience in how often they use MSN Internet search engines for research.

(b) Levels of study and the use of Internet search engines

Ho: There is no significant difference between levels of study in how often students use Google Internet search engines for research.
H4: There is a significant difference between levels of study in how often students use Google Internet search engines for research.
Ho: There is no significant difference between levels of study in how often students use Yahoo Internet search engines for research.
H5: There is a significant difference between levels of study in how often students use Yahoo Internet search engines for research.
Ho: There is no significant difference between levels of study in how often students use MSN Internet search engines for research.
H6: There is a significant difference between levels of study in how often students use MSN Internet search engines for research.

(c) Gender and the use of Internet search engines

Ho: There is no significant difference between gender and how often students use Google Internet search engines for research.
H7: There is a significant difference between gender and how often students use Google Internet search engines for research.
Ho: There is no significant difference between gender and how often students use Yahoo Internet search engines for research.
H8: There is significant difference between gender and how often students use Yahoo Internet search engines for research.
Ho: There is no significant difference between gender and how often students use MSN Internet search engines for research.
H9: There is significant difference between gender and how often students use MSN Internet search engines for research.

METHODOLOGY

The questionnaires for this study were administered to 500 undergraduate business students from a private university located in Klang Valley, Malaysia. The students completed the survey during class time and were assured anonymity. Participation was voluntary and no remuneration was offered. Several faculty members were requested to assist in the distribution of the questionnaires to business undergraduates across year 1 to year 3. The university where the survey was conducted did not require the students to undergo formal information literacy modules or information management skills courses.

There were two parts to the survey. Part A required respondents to fill up their demographic details such as race, current year of study, gender, study major and years of computer technology experiences. Part B required respondents to indicate how often they use Internet search engines for their research from 3 variables: Google, Yahoo and

MSN. Students were asked to rate 1 (Very often), 2 (Often), 3 (Occasionally), 4 (Rarely) and 5 (Never). The three Internet search engines were selected based on literature review undertaken in this study and observations of student information search behavior undertaken at the university library.

A total of 361 completed questionnaires, deriving a response rate of 72.2% were obtained and deemed sufficiently complete to be useable. Prior to subjecting the data to statistical analysis, frequency distributions were tabulated for each item to ascertain possible response biases. In addition, visual inspection of the data was also performed to identify any possible anomalies. None were detected and the sample was determined to be of sufficient quality to be subjected to statistical analysis.

RESULTS

Profile of respondents

There were 233 (64.4%) female and 128 (35.5%) male respondents. There were more female students in the survey due to the demographic composition of almost 3 to 1 female students versus male students in the private and public universities in Malaysia. This study culled a close ratio of 2:1 female and male students. Among the respondents, there were 0.3% Malays, 98.3% Chinese, 1.1% Indians and 0.3% from other races. With regards to the levels of study, 29% were in Year 1, 25.7% in Year 2 and 45.3% in Year 3. As for the number of years experience in using computer technology, 10.2% were in the category of less than 2 years, 43.4% from 2-4 years, 31.5% from 5-7 years and 14.9% had 8 years and above.

Analyses of data

The first part of the analysis used the one-way ANOVA for measurement of differences between years of computer technology experience and the use of Internet search engine. Table 1 illustrates the results. It can be observed that there was a significant difference between years of computer technology experience and the frequency of usage in the case of Google as the search engine. Therefore H1 was supported. H2 and H3 however were not supported which indicate that there were no significant differences in the years of computer experience and the frequency of use for search engine yahoo and MSN. The post hoc test conducted shows a significant difference in the Internet search between those who have less than 2 years of computer technology experience and those who has more that two years of technology experience. Based on the mean score, it can be seen that those who have more years of using computer technology experiences tend to use Google more often as a research tool compared to students who have less than 2 years of computer experiences.

Table 1: One-way ANOVA results of Internet search engine use by years of computer technology experience (n=361)

Internet Search Engine	< 2 years (Mean)	2 to 4 years (Mean)	5 to 7 years (Mean)	> 7 years (Mean)	Significance
Google	1.78*	1.37*	1.42*	1.24*	0.004*
Yahoo	2.00	1.99	1.78	1.81	0.338
MSN	3.14	2.85	2.81	2.83	0.592

* $p < 0.05$

The second part of the analysis looks at whether there are significant differences between levels of study and Internet search engine usage. Table 2 shows the result of a one-way ANOVA. In this instance, it was found that there were no significant differences in the levels of study with all the three Internet search engines (Google, Yahoo and MSN). Therefore H4, H5 and H6 were not supported. On closer investigation of the results by looking at the mean score across the Internet search engines, it was discovered that for all levels of study, Google was the preferred choice of Internet search engine compared to Yahoo and MSN.

Table 2: One-way ANOVA results of Internet search engine use by levels of study (n=361)

Internet Search Engine	Year 1 (Mean)	Year 2 (Mean)	Year 3 (Mean)	Significance
Google	1.51	1.44	1.32	0.117
Yahoo	1.94	1.94	1.85	0.719
MSN	2.74	2.73	3.02	0.101

* $p < 0.05$

Table 3 provides the results of the independent sample t-test for gender (male/female students) and the frequencies of Internet search engine use (Google, Yahoo and MSN). Based on the results, H7, H8 and H9 were supported which indicates that there were significant differences between male and female students in how often they use the Internet search engines for Google, Yahoo and MSN when approaching research. For all the search engines, female students were found to search more often at the Internet search engines compared to their male counterparts. Based on the mean score results across the search engines usage, it was shown that in general both male and female students prefer to use Google as their choice of Internet search engine compared to Yahoo (2^{nd}) and MSN (3^{rd}).

Table 3: Independent sample t-test results of Internet search engine use by gender (n= 361)

Internet Search Engine	Male (Mean)	Female (Mean)	Significance
Google	1.54	1.34	0.021*
Yahoo	2.14	1.76	0.001*
MSN	3.05	2.76	0.039*

* $p < 0.05$

Table 4 provides a summary of the research results in relation to the nine hypotheses discussed so far.

Table 4: Summary of results in relation to the research hypotheses

No	Hypotheses	Finding
H1	There is a significant difference between years of computer technology experience in how often they use Google Internet search engines for research.	Supported
H2	There is a significant difference between years of computer technology experience in how often they use Yahoo Internet search engines for research.	Not Supported

H3	There is a significant difference between years of computer technology experience in how often they use MSN Internet search engines for research.	Not Supported
H4	There is a significant difference between levels of study in how often students use Google Internet search engines for research.	Not Supported
H5	There is a significant difference between levels of study in how often students use Yahoo Internet search engines for research.	Not Supported
H6	There is a significant difference between levels of study in how often students use MSN Internet search engines for research.	Not Supported
H7	There is a significant difference between gender in how often students use Google Internet search engines for research.	Supported
H8	There is significant difference between gender in how often students use Yahoo Internet search engines for research.	Supported
H9	There is significant difference between gender in how often students use MSN Internet search engines for research.	Supported

DISCUSSION

In the case of business undergraduates with more than two years of computing experience, the result shows that they are prone to use Google as the first choice of Internet search engine. This indicates that the more experiences the students have in computing knowledge, the more likely they will be using Google in information seeking at the Internet. More efforts are needed especially from information professionals to educate those with less than 2 years of computing experiences on the alternative use of more reliable search especially using the library online databases.

As for gender, differences have been observed on the usage of Internet search engine with female students searching at the Internet search engines more often than male students (for Google, Yahoo and MSN). However in general, it has been shown that both male and female students preferred to use Google as their choice of internet search engine in information seeking for research. In the case of levels of study, there is no significant difference in the level of study with the usage of all the search engines. However, the mean score across the Internet search engines indicates that for all levels of study, Google is the preferred choice of Internet search engine compared to Yahoo and MSN.

The above findings have clearly indicated that Google is the preferred Internet search engines as a research tool in information seeking. This is consistent with the result of the study reported by Yi (2007) and Brophy and Bawden (2005). Thus it is imperative to improve the business undergraduates' research skills by providing training in information skills to impart the ability to recognize the information needs and locate the required information so that they would be able use them critically for research. Additionally the faculty may want to consider providing guidelines for using open web resources retrieved from the Internet. In concerted efforts with the university library, the teaching faculty could provide guidelines to review information sources as suggested by Robinson, Andrew and Schlegl (2005) and influence students use of web-based information choice when supervising students research work. Undoubtedly the information professionals need to keep current with Information literacy practices for continuous improvement of user services and maximize return in investment on library resources.

LIMITATIONS AND FUTURE RESEARCH

Several limitations should be borne in mind when interpreting the results of the study. The findings of the research should be interpreted with caution due to the fact that the samples consisted predominantly of students of Chinese descent. The study therefore will not be generalized to the whole population of Malaysia. Future research should endeavor to include a representative sample of the Malaysian university students. Additionally future research should also look at how the students evaluate Internet search engines as compared to OPAC or the reasons for students' preference in using the Internet in their academic research.

CONCLUSION

This study provides insight into information behavior among business undergraduate students in a private university in Malaysia. The results of this study provide insights to the needs for information literacy initiatives to be considered in an encompassing educational learning process for private higher education locally. It would contribute to producing quality human capital for nation building towards a progressive society. In Malaysia, the contribution of Kim (1998) first made such representation for this initiative in the 2nd Asia Regional Literacy Forum in New Delhi. Local public university libraries such as the University of Malaya library serves as an exemplary engagement in information literacy study by formalizing the information skills as a course subject with credit bearing included in the curriculum from 1998/1999 academic session (Chan 2003). Suggestion from Hepworth (1999) invites thoughts from policy makers and educators to consider including and embedding information literacy skills to students at different levels of educational system, and to become informed citizenry in this 21st century (Rader 2002).

The findings on the respondents web searching behavior related to the use of three commercial Internet search engines in information seeking for research reflect the need to take advantage on the popularity of using the Net as research tool. The word Google has now been commonly used as a verb and has also been added to many dictionaries in recent years as reported by Wisnicki (2007). He also recommended that Google Scholar (GS) is a useful tool for searching scholarly literature. Nevertheless, future researchers need to bear in mind that the background of the author as an experienced research practitioner will be needed to ascertain certain levels of information literacy skills. Thus, it is recommended that serious considerations be given to provide information skills training through concerted efforts of the university management, the information professionals such as the librarians, and the faculty so that it would eventually add values to the information seeking quality of the undergraduate students in research for academic learning. Furthermore, this in turn will inculcate a life-long learning skill to their academic, private as well as professional lives.

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