How graduate students seek for information: Convenience or guaranteed result?

S. Liyana[1] and A. Noorhidawati[2]
[1]Department of Information Systems,
Faculty of Computer Science and Information Technology,
University of Malaya,
50603 Kuala Lumpur, MALAYSIA
[2]Department of Library & Information Science
Faculty of Computer Science and Information Technology,
University of Malaya,
50603 Kuala Lumpur, MALAYSIA
e-mail: liyanashuib@gmail.com (corresponding author);
noorhidawati@um.edu.my

ABSTRACT

This paper reports on the information seeking behaviour of computer science graduate students. The following research questions are put forward to address the main research objective on how graduate students seek for information: i) what type of information resource do computer science graduate students use?; ii) how do computer science graduate students seek and obtain information?; iii) what are the problems faced by computer science graduate students while seeking information?; iv) does any relationship exist between the use of different information resources and graduates' demographic information (i.e., age and type of graduate program)?; v) does any relationship exist between the use of different information resources and problems in finding information?and vi) does any relationship exist between the use of different information resources and success in finding information?. A survey was conducted at the Faculty of Computer Science and Information Technology, at the University of Malaya, with a sample size of 217 graduate students. The data gathered was analysed quantitatively using SPSS statistical software. The findings show that even though the Internet Search Engine is the first information resource used by computer science graduate, they are however still in doubt with the trustworthiness of the information they retrieved. This has made the students dissatisfied with their initial findings that led them to use more reliable information resources, such as digital libraries and online databases. This study provides insights into how computer science graduate students seek information that offers improvement implications to the development of available information resources and library services.

Keywords: *Information seeking behaviour, Information resources, Information retrieval tools, Computer science graduate, Convenience information seeking*

INTRODUCTION

Information seeking behaviour is defined as a purposive process of seeking information as a consequence of a need to satisfy some goals (Wilson 1999). Information seeking behaviouris influenced by several factors, such as the amount of effort exerted by searchers, the information system interface, the searcher disciplines, and role in academic such as the role of graduate students is different from undergraduate students (Jamali and

Nicholas 2008; Catalano 2013). While faculty members can be considered as experts in their discipline, undergraduates are considered as a novice, and graduate students would be somewhere in between. This is because graduate students are in the process of advanced learning to becoming an expert in their own field. This was supported by Khosrowjerdi and Iranshahiv (2011) who reported that information seeking behaviour as a positive and significant relationship with seekers' prior knowledge; such as their expertise, familiarity, and past experiences.

Barret (2005) studied the information seeking behaviour of graduate students in humanities and compared it with existing models of undergraduates. Although his findings demonstrated overlapping behaviours in certain areas, such as regularly using generic Internet search engines to find general information on a topic, information seeking behaviours of graduate students are different from those of undergraduate students, due to their research background and experience in seeking information.

Discipline also plays a vital role in information seeking behaviour (Urquhart et al.2005; Rowlands and Nicholas 2008). This is because different disciplines provide different training and experience to students. Preceding studies on information seeking behaviour have been conducted in various disciplines, for instance, in social science studies were carried out by Catalino (2010) and Wu and Chen (2010). In medicine and biology, such studies were conducted by Eskola (2005) and Vezzosi (2009). While Jamali and Nicholas (2008) Kai-Wah Chu and Law (2007) and Korobili et al. (2011) conducted studies in astronomy and engineering. In addition, Mohd. Sharif and Zainab (2007; 2009) conducted studies on undergraduate students in computer science discipline. However, little is known about how graduate students of computer science behave when seeking information. In general, researchers were more interested in studying novice user's behaviour, as stated by Ismail et al. (2009) compared to studying users that had an Information and Communication Technology (ICT) background, similar to that shown by computer science graduate students.

Since graduate students of computer science have received little empirical attention from researchers, their information seeking behaviour often resembled those of other disciplines or undergraduates. With higher levels of education and an ICT background, graduate students of computer science may possibly have a different behaviour in seeking information. This assumption is based on the premise that computer science graduate students have relatively more Information Technology (IT) and information seeking skills, due to their education background, experience and skill in ICT. As graduate students, their engagement in the research process would be more proficiently that undergraduate students as articulated by Catalano (2013). Therefore, this apparent gap suggests that it is necessary to explore their information seeking behaviours and investigate to what extent they might constitute being a unique user group. Hence, graduate students of computer science were chosen to present a unique user group, due to their relatively higher levels of IT, research and information seeking skills compared to others.

In this vein, this study investigates how graduate students navigate and search for information, and what information resources they choose to satisfy their needs. The rest of this paper is organized as follows; a discussion on the related works regarding information seeking behaviour and various information resources; followed by a description of the research method used; a discussion of the findings; and finally, a conclusion is drawn and possible directions for future works are identified.

LITERATURE REVIEW

Rapid developments of information environments have brought significant changes on how information seekers look for information. Nowadays, users; especially the Millennial Generation (i.e., those born between 1979 and 2000) - also dubbed as the Net Generation - adopt convenience as a criterion in choosing information sources or strategies. Users who adopt convenience information seeking use minimal amounts of effort to satisfy their needs; this has been delineated as the Principle of Least Effort, as first proposed by Zipf (1949). This principle has been used as an underlying notion in convenience information seeking, which demonstrates a user's preference to use easier information resources, while seeking for information (Connaway et al. 2011; Liu and Yang 2004). However, "satisficing" is another intriguing phenomenon that reflects upon the Principle of Least Effort, which was defined by Simon (1955). Satisficing is a combination of the words satisfy and suffice, and reflects upon the user's behaviour to choose what is satisfactory (or good enough) rather than what is best (Byron 2004). Satisficing is characterized by the amount of effort the information seeker is willing make in finding information. In this case, information quality is normally compromised in favour of the most convenient method.

Different students access and use varying information resources for diverse reasons (Cooke 2001). Various types of information resources are available for students. For the purpose of this study, four types of information resources are used in the investigation namely: the Internet search engines (e.g Google, Yahoo, and AltaVista); Online Public Access Catalogues (OPAC); Online Databases (e.g. Elsevier, IEEE, and ACM) and Digital Library such as Dspace@UM and DigiLibraries.com.

Nowadays, most users value Internet search engines for their convenience for searching for information. Google has been identified as their first choice for fast searches, thus by passing other information resources. This has been evident in previous studies, such as Julien and Barker (2009) who have consistently demonstrated that information seekers rely heavily on the Internet to search for information. Reports by Connaway et al. (2008) and Jamali and Asadi (2010) have shown that Google in particular is the search engine of choice. Furthermore, Liu and Yang (2004) reported that graduate students have a strong preference for easy and fast information retrieval, with the highest percentage using Internet search engines as their primary information resource. However, this study addresses the distance education domain, which may be particularly influenced by individual and environmental factors.

Despite constant findings of a strong preference to use Google as a primary information resource, information seekers reportedly choose different resources for different information needs, as stated by Agosto and Hughes-Hassell (2005) and Singh (2008). More recently, McKay and Buchanan (2011) explored how users utilize different information resources, including library catalogues, library databases, and Google Scholar. Their findings indicate that although users used different information resources, they still used short and simple searches. The study also revealed that library resources were difficult to use. This might imply that users are often acquainted with a basic search as imposed by internet search engines, they then desired the same features to be provided by other information resources especially the ones offered by libraries.

Although a number of studies reported Internet search engines as users' first choice of information resources, Connaway et al. (2008) reported that users in academic settings,

turn to library resources for more in-depth information. He concluded that users usually turned to Online Databases and Digital Libraries to find scholarly and scientific information. Despite several varying outcomes, Internet search engines appeared to be the most popular choice, because of their free access, speed, simplicity, convenience of use, and they provide unlimited full-text content; as compared to OPAC, Online Databases, and Digital Library (Brophy and Bawden 2005; Rowlands et al. 2008; Wu and Chen 2010). Users found OPAC to be complex and lacking in search functions (Kumar 2012) whilst some Online Databases and Digital Library could not be accessed for free.

A review of information seeking behaviour studies done by Catalano (2013) reported that none of the studies focused on computer science graduates. Although Mohd. Sharif and Zainab (2007; 2009) conducted studies on how undergraduates of computer science searched for information, they could not be used to measure graduates of computer science, because their prior knowledge was different. The following section presents the details of this research's objective and methodology.

RESEARCH OBJECTIVE

The main objective of this research is to investigate the information seeking behaviour of computer science graduate students and their choice of information resources. More specifically, this study was conducted to answer the following questions:

a) What type of information resource do computer science graduate students use?
b) How do computer science graduate students seek and obtain information?
c) What are the problems faced by computer science graduate students while seeking information?
d) Does any relationship exist between the use of different information resources and graduates' demographic information (i.e., age and type of graduate program)?
e) Does any relationship exist between the use of different information resources and problems in finding information?
f) Does any relationship exist between the use of different information resources and success in finding information?

METHOD

A survey was conducted in order to answer the above research questions. The survey was administered to graduate students from the Faculty of Computer Science and Information Technology (FCSIT), University of Malaya. Respondents included graduate students in coursework, coursework and research, full research programs, and those actively undergone their PhDs within the academic year of 2010/2011. The survey contained 20 questions, categorized into four sections. The survey instrument included a variety of questions using a Likert scale, multiple choice, and open-ended:

- Part A: Demographic details of respondents, such as gender, nationality, and level of studies (6 questions)
- Part B: Problems respondents experienced during the information seeking process (5 questions)
- Part C: How respondents searched for information (4 questions)
- Part D: How respondents evaluated and verifiedthe information that they had retrieved (5 questions)

The initial questionnaire was pre-tested using Cooper and Schindler's (2006) pretesting method; where the questionnaire was reviewed by two senior researchers from the same field, in order to ensure that the questions were valid and accurate. After the questionnaire was revised and modified, a pilot test was performed using a small sample of respondents (n=10), of computer science graduate students from other universities. A full scale data was collected through online method. The questionnaire was distributed to graduate students via email attachment. Two weeks after the initial email was sent, a follow-up email was sent to remind respondents to complete their questionnaire. A second follow-up email was sent to those respondents who did not respond within one month. However, no incentives were provided to respondents to complete the questionnaire.

With a 500 graduate students currently active in FCSIT as a population size, a 217 was identified as a sample size according to Krejcie and Morgan (1970). After two of data collections, 156 responses were gathered. After conducting a data cleaning proses, a total of 140 usable responses were collected that resulted in a 64.5% response rate.

RESULTS

Demographic Profiles of Respondents

A total of 140 respondents responded to the questionnaire. Based on Table 1, out of the 140 respondents, 55.7 percent (n=78) were male and the rest were female. Ages of the respondents were classified as 25 years or below (20.7 percent), 26-30 years (44.3 percent), 31-40 years (22.9 percent), and 41 years or above (12.1 percent). Modes of study of the graduate students were Masters by Coursework (56.4 percent), Master by Research (34.3 percent), and PhD (9.3percent). The majority of graduate student's mode of study were full time students (84.3 percent). In terms of nationality, 52.1 percent (n=73) were Malaysians and 47.9 percent (n=67) were foreigners from Iraq, Iran, Indonesia, Bangladesh, and Sri Lanka. Table 1 shows the distribution of respondent's demographic profiles.

Table 1: Respondents' Demographic (N=140)

Demographic Profile		**Responses n (%)**
Gender	Male	78 (55.7%)
	Female	62 (44.3%)
Age	25 years or below	29 (20.7%)
	26-30 years	62 (44.3%)
	31-40 years	32 (22.9%)
	41 years or above	17 (12.1%)
Types of study	Masters by Coursework	79 (56.4%)
	Master by Research	48 (34.3%)
	PhD	13 (93%)
Mode of study	Full time student	118 (84.3%)
	Part time student	22 (15.7%)
Nationality	Malaysian	73 (52.1%)
	Non-Malaysian	67 (47.9%)

The Chosen Information Resources

Respondents were asked whether they used a variety of information resources or only one type of information resource to seek information. Table 2 shows that 56.4 percent (n = 79) of the respondents frequently used more than one information source. While those who reported often (30 percent), and sometimes (12.1 percent), made up the rest of this category. Significantly, only two students rarely used more than one information resource.

Table 2: The Use of a Variety of Information Resources (N=140)

Frequency of using a variety of information resources to seek information (N=140)	**Very Often**	**Often**	**Sometimes**	**Rarely**	**Almost Never**
Total N (percent)	79 (56.4)	42 (30)	17 (12.1)	2 (1.5)	0

Table 3 shows that Internet search engines were the most popular, with 90 percent (n=126) of the respondents perceiving it as their first choice. This was followed by Digital Libraries and Online Databases with 67.8 percent (n=95) of the respondents using them frequently. OPAC was found to have the lowest first choice usage, with only 26.4 percent (n= 37).

Table 3: First Choice of Information Resources Used (N=140)

	First Choice of Information Resources Used (%)			
	Internet Search Engines	**Digital Library**	**Online Database**	**OPAC**
Frequently	90	67.8	67.8	26.4
Occasionally	8.6	22.1	22.1	41.4
Rarely	1.4	10.1	10.1	32.2
Total	100	100	100	100

According to most respondents, after using an Internet search engine, they used another information resource; especially trustworthy ones, such as Digital Libraries and Online Databases, to search for more information. This was evident by the following respondents' comments noted in the questionnaire:

> *There are many resources available now and it is difficult to read all that is being published. One needs to be an expert to know how to select the most relevant resource based on the study area and not get carried away by so much information. Better to begin with Google Scholar and then get articles from library's subscribed databases or via document delivery*. [R17]
>
> *Normally, I use Google and the university's main library to get the information that I seek* [R14]
>
> *Mostly I use Internet search engine (Google Scholar).* [R36]
>
> *Search engines, such as Google,help a lot.* [R53]

Query Formulation

In order to search for information effectively, students must be able to identify and understand their problem and research area thoroughly. They should also be able to formulate a query that is related to their problem area. From the findings, 77.1 percent

(n=108) of the respondents were Often able to formulate their keywords with another 80.7 percent (n=113) indicating an Often use of combined keywords. Only a small percentage (19.3 percent) of the respondents reported that they Rarely formulated an appropriate keyword using a combination of keywords (as shown in Table 4).

Table 4: Respondent's Ability to Formulate Keywords (N=140)

Respondent's ability to formulate appropriate keywords	**Responses n (%)**
Often	108 (77.1%)
Rarely	32 (22.9%)
Respondent's ability to combine appropriate keyword	**Responses n (%)**
Often	113 (80.7%)
Rarely	27 (19.3%)

Determining the Reliability of Information

It is essential to examine whether information is reliable or not while conducting research. This was shown when more than 94.3 percent (n=132) of the respondents evaluated the trustworthiness and reliability of the information they found. Table 5 shows how respondents examined information to evaluate its reliability and trustworthiness; as both are important criteria when doing research. These findings demonstrate that the majority of the respondents examined information from journal publications (87.1 percent), followed by readings from abstracts (75 percent). Furthermore, the majority of respondents examined the reliability of information through reading introductions and conclusions (55 percent), followed by the date of publications (51.4 percent).

Table 5: How Respondents Examined Information (N=140)

How respondents examined information	**Responses n (%)**
From journal publications	122 (87.1%)
Reading abstracts	105 (75%)
Reading introductions and conclusions	77 (55%)
From the dates of publications	72 (51.4%)
Reading the title	62 (44.3%0
From the author's bibliography	54 (38.6%)

Note: Respondents could select more than one option

Satisfaction with the Information Found

Respondents'satisfaction with the information found was measured by evaluating whether the information found matched their preferences. 70 percent of respondents said that they Frequently felt satisfied with the information they retrieved. The respondents were then asked whether they could usually complete their research needs with the information found. Their responses were again positive towards this, when more than two-thirds (77.8 percent) of the respondents indicated Frequently, while the remaining 22.2 percent (n = 31) indicated Rarely.

In addition, respondents tended to use other information resources (85.7 percent) when they could not find the information that they sought first time. Respondents reported that they would follow up by conducting a new search using another different combination of

keywords (80.7 percent); consult an expert (58.6 percent), and discuss with friends (50.7 percent). For this question, the respondents were able to select more than one option (as shown in Table 6).

Table 6: Actions Taken by Respondents (N=140)

Actions Taken By Respondents	Responses n (%)
Try another information resource	120 (85.7%)
Try another combination of keywords	113 (80.7%)
Consult an expert	82 (58.6%)
Discuss with friends	71 (50.7%)
No Action	0

Ascertaining the Problems Faced during the Information Seeking Process

The study investigated to what extent respondents experienced problems when seeking information. Using a 4-point Likert Scale (where, 1=Frequently, 2=Occasionally, 3=Rarely, and 4=Never), respondents were asked to rate according to frequency. Findings showed that respondents Occasionally (53.5 percent), Frequently (29.5 percent), Rarely (14.7 percent), and Never (1.6 percent), experienced problems.

Table 7 ranks the problems respondents faced while seeking information. The findings revealed that 73.6 percent (n=103) of the respondents selected It is difficult to deal with the large amount of information available as the main problem in seeking information.

Table 7: Problems Faced by Graduate Students (N=140)

Problems	Responses n (%)
It is difficult to deal with the large amount of information available	103 (73.6%)
It is difficult to ensure that information sources are trustworthy	92 (65.7%)
It is difficult to understand the information found	77 (55%)
It is difficult to know where to find relevant information	57 (40.7%)
It is difficult to categorize my information needs	63 (45%)
It is difficult to know how to access information sources	48 (34.3%)
It is difficult to find information that is relevant to the search subject	46 (32.9%)

Note: Respondents could select more than one option

This study further investigated the use of different information resources in the information seeking process, by cross tabulating usage with other factors, such as age, type of study, problems experienced, and success in finding information. In addition, the Chi-square test was utilized to analyse whether an association existed between those variables.

The Use of Different Information Resources versus Age

Table 8 shows that respondents of different age groups used four information resources (in equal percentages) to seek information. A chi-square test was then performed to test the association between the use of information resources and the students' age. It showed that there was no association between these two variables, χ^2 (3, N=140) = 11.56, p>0.001.

The Use of Information Resources versus Type of Study

Table 9 shows that most students from Masters by Coursework (57 percent) used Internet Search Engines to seek information, while most PhD students (10.1 percent) used Online Database to find information. This was probably due to more reliable and trustworthy information being available from Online Databases, compared to the findings derived from Internet Search Engines. A chi-square test was then performed to test the association between the use of Information resources and type of study. It showed that there was no association between these two variables, χ^2 (3, N=140) = 1.249, p>0.001.

Table 8: Contingency Table of Using Different Information Resources and Age (N=140)

Information Resources	Age (%)				
	25 &below	26-30	31-40	41 & above	Total
Internet Search Engine	21.5	45.2	23	10.4	100
OPAC	21.4	39.3	25	14.3	100
Online Database	19.4	46.5	21.7	12.4	100
Digital Library	20.8	42.5	22.5	14.2	100

Table 9: Contingency Table of Using Different Information Resources and Types of Study (N=140)

Information Resources	Type of Study (%)			
	Masters by Coursework	Masters by Research	PhD	Total
Internet Search Engine	57	34.1	8.9	100
OPAC	52.7	40.2	7.1	100
Online Database	55	34.9	10.1	100
Digital Library	55	36.7	8.3	100

The Use of Different Information Resources versus Problems Finding Information

Table 10 demonstrates that the majority of respondents had problems when using the four different information resources to find information. Interestingly, they had the least number of problems when using Digital Library (79.2 percent). Using a chi-square test, no association was found between the use of information resources and problems experienced when searching for information, with χ^2 (1, N=140) = 0.00, p>0.001.

Table 10: Contingency Table of Using Different Information Resources and Problems Finding Information (N=140)

Information Resource	Problems Finding Information (%)		
	Yes	No	Total
Internet Search Engine	80	20	100
OPAC	81.2	18.8	100
Online Database	80.6	19.4	100
Digital Library	79.2	20.8	100

The Use of Different Information Resources versus Success in Finding Information

Table 11 demonstrates that more than two-thirds of the respondents were equally able to find information successfully, when using the four different information resources. A chi-square test was performed to test the association between using different Information resources and succeeding in finding information. The results showed that there was no association between these two variables, χ^2 (2, N=140) = 0.247, p>0.001.

Table 11: Contingency Table of Using Different Information Resources and Successfully Finding Information (N=140)

Information Resource	Successfully Finding Information (%)		
	Yes	No	Total
Internet Search Engine	69.6	30.4	100
OPAC	71.4	28.6	100
Online Database	70.5	29.5	100
Digital Library	70	30	100

DISCUSSION

The main purpose of this research is to investigate the information seeking behaviour of computer science graduate students and their choice of information resources. A survey was conducted to answer the following research questions:

a) What type of information resource do computer science graduate students use?

This study compared four information resources, namely OPAC, Internet search engine, Online Database, and Digital Library. The findings demonstrate that most of the respondents used several information resources. The most commonly used information resource was internet search engines. This finding is consistent with the findings of Saiti and Prokopiadou (2008) Barret (2005) George et al. (2006) Julien and Barker (2009) and Wu and Chen (2010) who reported that Internet search engines; especially Google, is the most preferred information resource amongst students. Previous studies on the use of different information resources in information seeking process shows that the latest generation of users prefer to use Internet Search Engines to find information, rather than other information resources like Digital Library (Barret 2005; Becker 2003; Salisbury et al. 2006; Saiti and Prokopiadou 2008; and Julien and Barker 2009), or OPAC (Kumar 2012), or Online databases (McKay and Buchanan 2011). This is based on the perception that Digital Library, OPAC, and Online Databases are constantly assumed to be complex and not very user friendly as stated by McKay and Buchanan (2011). In addition, many users were unaware of the suitability of Digital Library as an effective information resource as reported by Tov and Frank (2006). However, this study generally demonstrates that graduate students of the computer science discipline could find scholarly and trustworthy information for their research needs using the four aforementioned information resources (i.e. Internet search engines, OPAC, Online Databases, Digital Library).

b) How do computer science graduate students seek and obtain information?

This study revealed that most respondents used a variety of information resources although most of them demonstrated that they used Internet search engines as their first choice of resource. However, the respondents only used it as a first step in knowing about

the subject matter. Once they were acquainted with the subject matter, they used other more reliable resources such as Digital Libraries and Online Databases to retrieve more scholarly and trustworthy information as depicted in Figure 1. This is corroborated with findings from Connaway et al. (2008) and Catalano (2013).

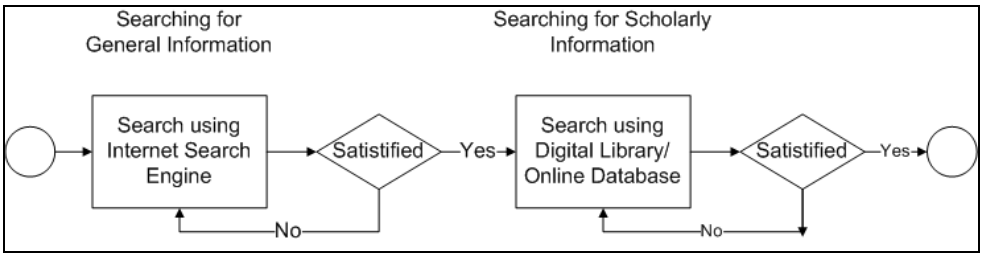

Figure 1: Information Seeking Behaviour of Graduate Students in Computer Science

c) What are the problems faced by computer science graduate students while seeking information?

The findings indicated that computer science graduate students did not face difficulties in finding information and they are able to combine appropriate keywords to find information. In general, computer science graduates' ability to seek for information was different from other students mainly because they knew the key to trigger in every step of the information seeking process. Normally, they were acquainted with how the query process worked and how keywords could be combined using Boolean Operators. Most of the respondents were reported of having problems in seeking information, specifically when looking for journal articles that were not fully accessible where only the abstract was available. Although the participants indicated that they could find the information that they desired but they were having problem with information excessive, difficulties to ensure the trustworthiness of the information and difficulties in understanding the information found. This is contradicted with the study conducted by Korobili et al. (2011) who investigated philosophy and engineering graduate students and reported that the problems faced were "too much time needed to retrieve the needed information," and "problems to retrieve records of good quality and relevant to the information need."

c) Does any relationship exist between the use of different information resources and graduates' demographic information (i.e., age and type of graduate program)?

The results show that no association exists between information resources and graduates' demographic information (i.e., age and type of graduate program). However, the findings indicated that students from Masters by Coursework were most likely to use Internet Search Engines to seek information, whilst PhD students preferred Online Databases to find information. This was probably due to more reliable and trustworthy information being available from Online Databases, compared to the findings derived from Internet Search Engines. This is in line with Barret (2005) in that even though there are overlapping behaviours in certain areas, such as regularly using generic Internet search engines to find general information on a topic, information seeking behaviours at different stages of study are different, due to their research background and experience in seeking information.

d) Does any relationship exist between the use of different information resources and problems in finding information?

The findings show that no association exists between information resources and problems in finding information. The problems faced do not involve information resources

themselves, but problems related to the information retrieved, such as information overload, difficulties ensuring that the information resources are trustworthy, and difficulties understanding the information found.

e) Does any relationship exist between the use of different information resources and success in finding information?
The correlation test shows no association exists between information resources and success in finding information. Therefore, there is not enough evidence to conclude that the use of different information resources would lead to the success or failure in finding information for computer science graduate student. Although the significant test fails to support the stated premise, result in Table 11 managed to show some trends than higher responses in finding information successfully using OPAC, Online databases and Digital Libraries compared to Internet search engine. This is in light could insufficiently support the argument that role and prior knowledge have effect on information seeking process as computer science graduates have relatively higher levels of IT and information seeking skills as compared to others which in agreement with Khosrowjerdi and Iranshahiv (2011). This finding however need to be treated with caution, while further study need to be conducted.

CONCLUSION

This paper discusses the information seeking behaviour of computer science graduate students, from University of Malaya. The study was carried out by examining the use of different information resources during the information seeking process, and investigated any problems encountered. It was discovered that respondents, in general, employed convenience information seeking behaviour, which was demonstrated by the use of internet search engines as their first choice of information resource, to seek a general understanding of the subject matter. Moreover, most respondents that were unsatisfied with their initial findings, tended to use other resources, such as Digital Library and Online Databases to gain further understanding and search for more trustworthy material.

This agrees with other findings that reported searcher preference of using the Internet (commonly Google), because of its simplicity, accessibility, convenience, speed, free access, and it provides unlimited full-text content, compared to OPAC, Online Databases, and Digital Library (Bell 2004; Brophy and Bawden 2005; Rowlands et al. 2008; Wu and Chen 2010). However, the computer science students still faced problems with information seeking, mainly related to being inundated with information retrieved and difficulties ensuring that the information resources are trustworthy. This was expected, as Internet Search Engines guarantee results for every search, by normally giving a high number of hits for every search term used.

A further investigation on the use of different information resources in the information seeking process, through cross tabulating usage with problems faced and success in finding information, revealed that those respondents were in essence having problems using internet search engines, OPAC, and Online databases; with fewer problems indicated when using Digital Library. This was possibly because Digital Library normally holds a collection of information on a particular domain that could meet the respondents' information needs; therefore, respondents had fewer problems in evaluating information for its relevancy and trustworthiness.

In addition, respondents indicated that they were able to find information successfully when using the four information resources, with the lowest percentage when using Internet Search Engines. This substantiated our earlier findings, that Internet Search Engines Are used merely for their convenience to constantly guarantee to retrieve information of every search; even though they subsequently return excessive numbers of less useful results.

In conclusion, respondents adopted convenience as their primary criteria in the information seeking process, despite their discipline and role (graduate students of computer science would relatively have higher levels of IT, research and information seeking skills compared to others). However, this finding needs to be treated with caution as a generalization that needs more solid evidence. It was demonstrated that respondents generally opted for Internet Search Engines to seek information, because of their convenience, easy to use, quick speed, user friendliness, and provision of full-text content. In implication, information centres and libraries, especially should improve their search services to at least mimic the functions available in the internet search engines, which provide a simple federated search function as a single one stop centre, with a user-friendly interface to keep abreast with the user needs in the new continuum.

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