An investigation of information seeking behaviour of Computer Science and Information Technology undergraduates: a qualitative approach

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ABSTRACT

It is a common fallacy to assume that undergraduates are skilled in finding and evaluating resources for their various learning needs. Information professionals need to find out strategies and courses of action undertaken by undergraduate students in order to perhaps improve information literacy skills or user education programmes. This qualitative study uses the diary, emails interaction and in depth face to face interview approach involving 14 final year Computer Science and Information Technology undergraduates whom shared their information search and use process. The objectives of this study are to find out the followings: (a) the decision on deciding research topics by final year students; (b) the sources and channels of information they use and prefer; (c) the utility of libraries and librarians; (d) the use of the Internet; (e) the search strategies adopted; (f) their thoughts on intellectual property and ethical issues. Among the main information sources used were the Internet, books and previous final year project reports. They also seem to rely a lot on their friends and lecturers as their source of information. Very few used journal articles, seminar papers or other sources. An understanding of their information seeking behaviour patterns is the focus of this paper. Informants' thoughts and feeling on the library services and the ethical use of information will be shared.

Keywords: User studies; Information literacy; Information seeking behaviour; Qualitative study; Undergraduates

INTRODUCTION

Information search and use or information seeking behaviour form an important part of students' life and we cannot assume that undergraduates are skilled in finding and

evaluating resources needed for their various educational needs. Libraries and faculty members continuously need to improve and orient their services, instruction methodologies, activities in tandem with the information seeking patterns of students in order to remain relevant and competitive. Information seeking behaviour is defined as "the complex patterns of action and interactions that people engage in when seeking information of whatever purpose" (Ellis 2003). User studies in library and information science are based on the premise that the effective library services must begin with a clear need of understanding of the actual needs to improve both the understanding of information use and information delivery (Saitri 1999). Investigations on the information needs and information seeking patterns of users would definitely help to improve teaching and learning and resources to cater the ever changing needs of their respective clientele.

This paper reports on a study carried out to investigate the information seeking behaviour of undergraduates. The study was carried out among 14 final year Computer Science and Information Technology, Faculty of Computer Science and Information Technology undergraduates, University of Malaya, Malaysia who are conducting their final project proposal. The objectives of this study are to find out the following: (a) the decision on deciding research topics by final year students; (b) the sources and channels of information they use and prefer; (c) the utility of libraries and librarians; (d) the use of the Internet;(e) the search strategies used; and (f) their thoughts on intellectual property and ethical issues when searching and using information.

METHODOLOGY USED IN STUDIES OF INFORMATION SEEKING AND INFORMATION SKILLS/LITERACY

Research on information seeking or skills/literacy in higher education has been carried out since the 1980s involving both undergraduates and postgraduates (Cameron 1983; Coupe 1993; Greer, Weston and Alm 1991; Leckie and Fullerton 1999). The methodology employed quantitative and qualitative data gathering techniques, using survey and focus group approach. Morrison (1997), from Canada employed the focus group method to examine the undergraduate perspective on the role of libraries in developing information skills. A small group of seven undergraduates volunteered at the Concordia University College of Alberta to discuss the concept of information literacy and the role of the library in developing the skills among the undergraduates. Hartmann (2001) conducted a focus group study among first year students at the University of Ballarat, Australia to understand why the information literacy programme was poorly utilized. The study involved three focus groups, two from the first year and one from the third year. Seaman's (2001) study of freshman students' focused on finding out how students acquire and use information. The study used both quantitative and qualitative methods. It started with an open-ended survey, followed by e-mails and interviews to gauge a better understanding of the processes. Among the findings were that the students consulted friends, teachers, classmates, parents and experts when looking for information

A qualitative methodology using interviews was carried out in a study with non-traditional undergraduates to examine the impact of information literacy instruction and their information seeking behaviour (Branch 2004). Using semi-structured questions, five participants were selected from twelve volunteers. Eskola (2005) researched on information literacy of medical students studying in the problem-based and traditional curriculum also utilized the qualitative methodology. Sixteen-second year medical students subjected to the problem-based learning education and fifteen second year students studying according to the traditional curriculum were involved. The methods for data collection were theme interviews, students' diaries, observation and relevant documents.

DATA GATHERING TOOLS: DIARY, ONLINE AND IN-DEPTH INTERVIEWS

The diary, emails interaction and an in-depth open ended face to face interview were employed in this study. Diaries as a data collection methodology has several advantages; first, diaries can provide a reliable alternative for events that are difficult to recall accurately or easily forgotten; second, it can help in collecting sensitive information and thirdly it can be use to supplement interviews data to provide a rich source of information on respondent's experiences (Corti 1993). A diary, considered as a research tool, is a kind of self administered questionnaire. It can range from being totally unstructured to a set of responses to specific questions (Robson, 2002). They can serve as a proxy for observation in situations where it would be difficult or impossible for direct observation to take place. Biographers, historians, literary scholars, sociologist and researchers in the medical and health has long used the diary or diary-interview as a research instrument to collect detailed information about behaviour, events or other aspects of lives. According to Oppenheim (1992) the use of diaries as an instrument commonly deals with behaviour rather than with attitudes or interest. Eskola's (2005) research on information literacy of medical students employed the students' diary as a data collection instrument. In this study the diary keeping method was followed by emails interactions and face-to face interviews asking detailed questions. This method is considered to be one of the most reliable methods of obtaining information (Corti 1993). Burgess (1993) recommended the use of diaries as a precursor to interviewing, especially as a mean of generating the list of questions to be covered in the interview. According to Zimmerman and Wieder (1977) the "diary-interview" method is useful in accessing phenomena which are not amenable to observation because they are unfocused or take place outside set time or environmental boundaries.

In the case of this study, respondents were reluctant in allowing the researcher to shadow them during information searching and usage process. More over they will be uncomfortable if the researcher were to tag along when they were doing their work. Several studies have advocated asking the informants to keep diaries which were then elaborated or developed into an in-depth interview on the subject matter. In order to achieve the objective of understanding the evaluation and decision making process of these undergraduates the respondents were requested to keep a diary of their information seeking process. In each search diary, participants were requested to note down the date, time and place of searches followed by the information searched, search process and the

sources looked at. Participants were also requested to list the sources that they found useful, note their feeling of satisfaction and any remarks they wish to convey. The diaries were submitted to the researcher every three weeks, to be analyzed by the researcher followed by emails interaction and face to face interview aimed to further clarify and understand situations. Questions were structured to collect information concerning informant's research topic and their information search strategies. This was done to complement annotations in the diaries.

The e-mails interaction and the face to face in depth interview were a type of interview which researchers used to elicit information in order to achieve a holistic understanding of the interviewee's point of view or situation. This type of interview involves asking informants open-ended questions and probing wherever necessary to obtain data deemed useful by the researcher. Also known as unstructured interviewing, this method is now generally agreed as one of the key method for data collection (Berry 1999). The purpose of the probing was to establish a clearer idea and to get an in-depth understanding of the data collected through the diary. These interviews will assist the researcher to determine the information given, clarify terms used and probe for additional information and details. It will at the end provide an understanding of activities and events which cannot be observed directly by the researcher who will be able to link them to the purpose of the research in order to provide a broad view of the situations, the population and the setting (Salkind 1997).The process of data gathering took a period of seven months. The approach of the diary, e-mails and in-depth interview questions are all open ended and aimed at getting rich data for analyses.

BACKGROUND OF THE STUDY

All semester 1 final year students, enrolled in the Bachelor of Computer Science (CS) and Bachelor of Information Technology (IT) at the University of Malaya, Malaysia are required to fulfill a 4 credit part I of their Final Year Project. This is part of a nine-credit course, which extends over two semesters. The first half (4 credits) requires the students to choose a project title, carry out an extensive literature review as well as identify similar systems in the domain they are developing, interview clients, understand their project scope, analyse their project objectives as well as requirements and write these in the first three chapters of their report. During this process the students are required to read and search extensively. At the end of the semester students are expected to be able to explain about their proposed project and its viability. In this scenario these students are faced with a definite problem situation, which requires them to obtain information. They are expected to be computer and Internet literate by virtue of being adequately exposed to the CS and IT programmes for at least 2 years; and they are expected to be information skilled as they have taken a one-credit course in "Information skills" offered by the University Library in their first year.

This research is concerned about students' searching, evaluating and using information rather than the IT skills associated with it. The students volunteered as respondents. The researcher believed the volunteers would be able to provide information because they are

the experts and are privileged in witnessing (doing the research project) the event (Weiss, 1994). The sampling of this group is therefore purposive. The lecturers, who supervise students for the Final Year Project, were approached to get volunteers among their supervisees. The criteria used for selection were: a) students must be willing to complete their Information Search Diaries; b) they must respond to the questionnaires posed through the e-mail; and c) they must participate in the periodic face to face interviews. The data gathering took over a period of nine months. The findings are discussed as follows.

The Decisions on Choosing the Project Title

In the process of selection of titles (topics) for their project, the Faculty members would provide titles, with specifications and requirements for each project on the Faculty's website. The students could view them, make reservation and subsequently meet their potential supervisor for details. Apart from the titles proposed by lecturers, students were also encouraged to propose titles that interest them. As shown in Table 1, more than 50% of the informants depend on the titles provided by the lecturers (8, 57%) These informants (R1, R3, R4, R6, R7, R10, R12, and R14) however did discuss their choice of topics with their lecturers/supervisors. Three informants R3, R4 and R9 propose their own title for their Final Year Project. Their friends and seniors seemed to play a major role in the selection of the title for the Final Year Project. At least 6 (42.8%) informants discuss their choice of topic with seniors/friends (R2, R5, R6, R7, R10, R12).

These informants felt their seniors would be able to guide them in not only selecting the title but also when doing the actual project. Agreement on the title is very important for the informants since they believed that their grades will be at stake if they do not listen to the advice of their lecturers. Some felt it is important to give whatever is required by their supervising lecturers, and hope that at the end of the course they will obtain a good grade. Overall only 4 (28.5%) informants (R8, R11, R13, R14) accepted their topics without discussion. The rest, 10 of them at least, discussed it over with lecturers, seniors/friends and even their parents. This does indicate that at least 71% of the informants do have the ability to recognize and understand their need for information. During those discussions on the topic they were also able to gauge the scope, objectives and the information needed for their projects.

Table 1: Choosing their project title

Informant	Responses
R1	After discussion with lecturers, academic assistant, tutors, seniors
R2	Browsing through lecturer's list for personal favourite, I look for something interesting and nice to do. If I don't understand I will ask friends for advice or browse the Internet for more information
R3	I discuss with my father and the lecturer before proposing my topic
R4	I initially choose from the titles given by lecturers, but after discussions with my supervisor I have change the title
R5	With my friend from topics given by the lecturer
R6	I discuss with fellow course mates and some seniors, and then the lecturer who offers that title
R7	Discuss with friends, did some research on the topic and then discuss it with my supervisor
R8	Given by the lecturer, I was already late, and manage to get a lecturer to supervise me, what ever title she suggested I agreed
R9	My supervisor have accepted the title I proposed
R10	Seniors from my industrial training company, they really help me to clear up my confusion. Meanwhile I also consulted my supervisor and discuss with my group members
R11	Supervisor
R12	First I discuss with friends, then I went to see my supervisor
R13	Lecturer
R14	Supervisor, she gave me the idea

Information Sources Used and Search Patterns

Being in the final year, informants are expected to use various sources of information within and outside the libraries. They have experience using various sources when undertaking their course projects and assignments for the past two years. All 14 informants stated that they used the Internet and the past year Final Years Project reports. The Internet and the

past years project reports were being utilized as a mean to familiarize them with the project title and considered as an important source of information (Table 2). For people related source of information, friends (12 informants) and lecturers (12 informants) were also an important source of information. Informants also seem to gather information through surveys, interviews and visits (8 informants). Informants seem not to be able to appreciate the role of the librarians in facilitating search of the much needed information for their projects. Only one of them communicates with the librarian (R6). Books were high on the list of information sources. Journal articles were among the least used source.

Table 2: Information sources

Information Sources	Respondents														
	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	Total
Internet	X	X	X	X	X	X	X	X	X	X	X	X	X	X	14
Past years Final Year Projects	X	X	X	X	X	X	X	X	X	X	X	X	X	X	14
Lecturers	X			X	X	X	X	X	X	X	X	X	X	X	12
Friends	X	X		X	X	X	X	X	X	X	X	X	X		12
Books	X	X	X	X	X	X	X		X	X	X			X	11
Interview/Survey /Questionnaires			X			X	X	X	X	X		X	X		8
Journal Article		X	X	X									X	X	5
OPAC		X		X	X		X								4
Buy Books	X	X		X	X										4
Visits			X				X	X				X			4
Electronic Full Text			X	X		X									3
Brochures										X	X				2
CD Rom					X										1
Newspaper & Television												X			1
Seminar Papers				X											1
Attended Seminar	X														1
Reference Librarian						X									1
Online Index/Abstract															-
Government Reports															-

(a) The Internet

Every informant used the Internet to find information. There were several reasons for using the Internet. Among them were that it was a quick way of getting information and accessing the facility was readily available to them. Searching of the Internet was regarded as very convenient for all of them. It could be carried out in between classes, in the evenings or over the weekends. It could be carried out not only on campus but also at their hostels,

their residence or even at cyber cafes. Informants claimed they can save the information found and read them later.

Through the Internet they believed that they would obtain be getting the most up-to-date information. The Internet provided them with the necessary links to further explore the information they were looking for. Every informant felt that the Internet was the ultimate source of information and that information obtained from the Internet was sufficient. R2 claimed that "Internet and books cover 70% – 80% of the information I need", while R14 summed up that "Internet provide the majority of information, if I want to find from other sources, it would take a longer time". Figure 1 illustrates the information search and use pattern using the Internet by the informants and problems they experienced while using the Internet.

When using the Internet, the informants used various search engines such as Alta Vista, MSN, WebCrawler, Google and others. Most of the informants prefer to use Google, which they perceived as a good search engine that can provide most of the information they were looking for. They claimed that their lecturers recommend using Google. Informants seemed at ease when searching the Internet. Most of them tend to use wild cards and keywords/subjects or phrases when searching.   R11 explained "when I am searching databases or search engines, I use * *. I seldom use Boolean operators, since using ** is easier". R10 added that "Enter the keywords or phrase in this (+ "phrase/keyword") format or use the advance search in those search engines". This of course results in huge listings, but the informants seemed not too worried about the outcome. Informant R2 explained that usually, he gets the results he required from the first page, but most of them will be scanning the first 5 to 10 pages that comprises up to the first 50 - 100 listings. They believed that the more hits they get the more choose they can choice from. What worried them was when the search terms used do not give them any useful result. However some informants like R5 are dazzled by the amount of listings she received when searching the Internet. She considered herself to be overloaded with information.

(b) Past Years Final Year Reports
The informants must submit their proposals in writing according to specifications given by the faculty. Although the informants have been given guidelines on how to write their proposal, all of them still refer to the past years Final Year Project reports because they believe it as an authentic and authoritative source of information on how a proposal should look like. Furthermore these reports are kept in the Faculty's library. They felt that they were more confident of their proposals after looking at the previous works. Informants claimed that they can get ideas on similar systems they will be developing and look forward to be able to improve previous systems that have be done by their seniors. Figure 2 illustrates the search and use pattern of previous Final year reports by the informants.

Information Search	Subject	System
Approach/Methodology	Use of Search Engine Subjects Keywords Wildcards Boolean	
Selection/Evaluation	1st Page Display 5-10 Pages All Pages edu, .ac Sites Compare Information/ Authority /Up to datedness / Biasness / Lecturers / Friends	
Outcome	Needs Met Partially Met Not Met	
Further Action	Continue Seeking and Evaluating	
Problems	1. Information Overload / 2. Lack of Information / 3. Wrong Keyword/Search Terms / 4. Verification/Evaluation of Information	
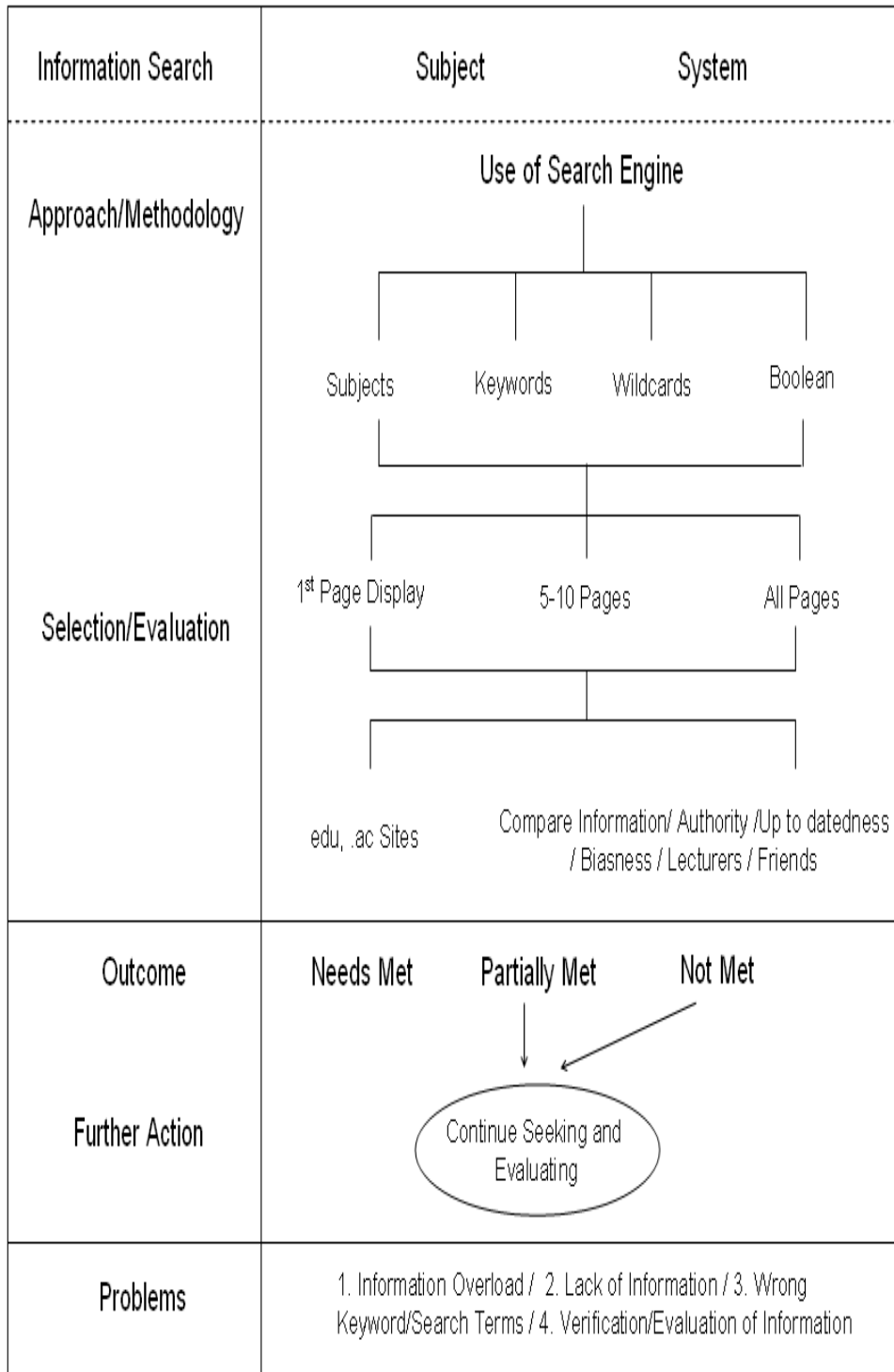
Figure 1: Search pattern of the Internet

Information Search	Subject	System
Familiarity	Know the Report	Do not Know the Report
Method of Access	Recommended by Friend Recommended by Lecturers	Browsing
Outcome	Needs Met Partially Met Not Met	
Further Action	Continue Seeking and Evaluating	
Problems	1. Cannot find the required Information / 2. Limited Opening Hours	
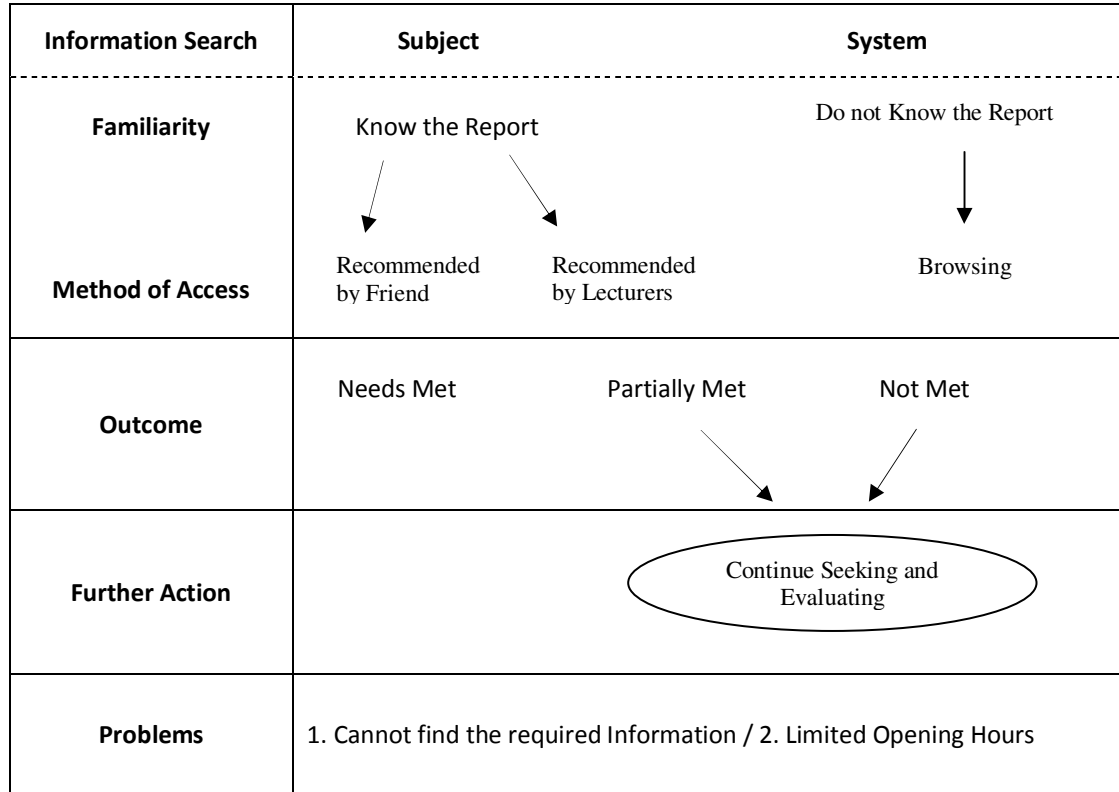
Figure 2: Information search and use pattern of past years report

(c) Books

Apart from referring to texts recommended by their respective supervisors, informants tend to check the University of Malaya Library's OPAC for books available in the library. Informants agreed that the content from books were reliable and authoritative especially if the books were from the library, since their lecturers were the ones that had suggested the titles. R2 commented, "I have to agree that books are definitely the most reliable source of information, at least printed materials are normally considered more reliable and trusted". Every informant feels that information obtained from the books are also better organized. Figure 3 illustrates information search and use process of books.

Apart from getting books from the library, informants will also look for suitable books related to their projects in the bookstores. R1, R2, R4 and R5 admitted that for their Final Year Projects they bought books that were useful for their projects especially to understand the software platform and peripherals, which they need to use in their projects. The more books they have, the better they felt. Unfortunately for most of the informants, the books on the subjects they were looking for, are sometimes not available in the university libraries

like in the case of R1, "too few titles are available", and he further claimed that " there are only 5 – 6 books on neural net", the subject of his Final Year Project. However there were Informants R8, R12 and R13 who did not look for books in the library because they felt that information about their projects cannot be found in the library and searching for information in the library would be a waste of their time. R8 says, "I believe its time consuming; the books I am looking for are not available in the library, it's tiring "

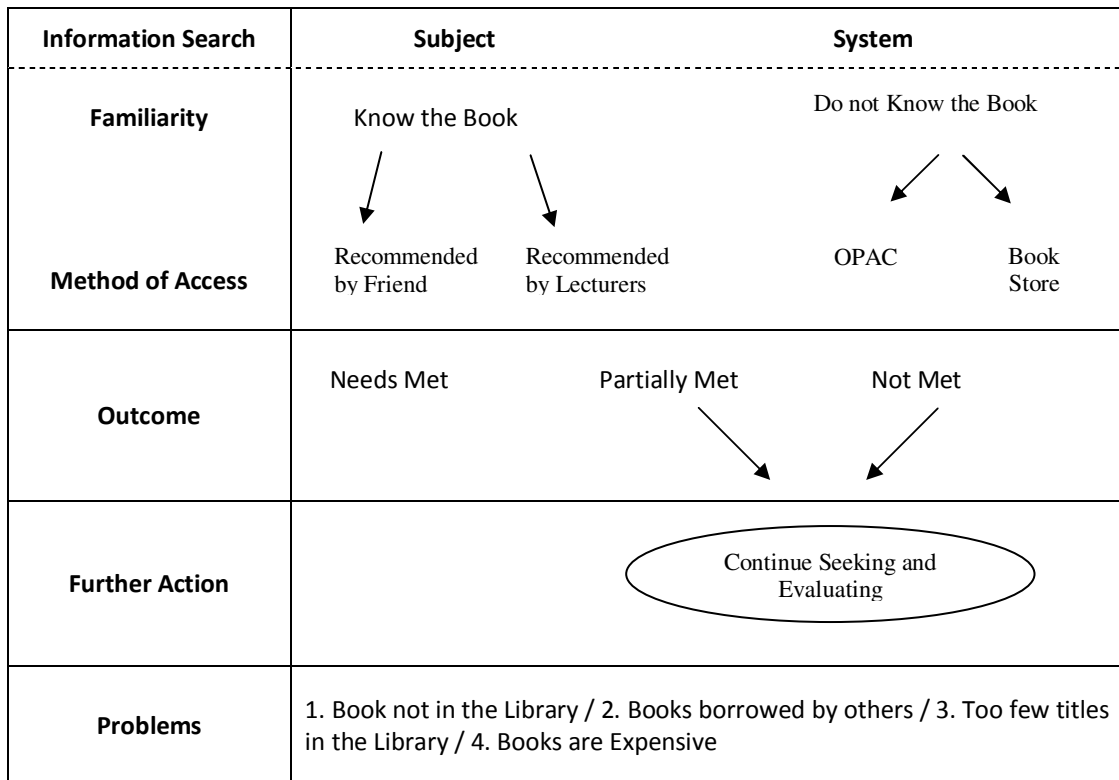| Information Search	Subject		System	
Familiarity	Know the Book		Do not Know the Book	
Method of Access	Recommended by Friend	Recommended by Lecturers	OPAC	Book Store
Outcome	Needs Met	Partially Met	Not Met	
Further Action		Continue Seeking and Evaluating		
Problems	1. Book not in the Library / 2. Books borrowed by others / 3. Too few titles in the Library / 4. Books are Expensive			

Figure.3 : Information search and use pattern of books

(d) Lecturers/Supervisors

Lecturers or supervisors play vital roles during the project proposal stage. Their role was to advice the students on the steps to be taken by them to propose, design and develop a system. Most of the informants seem to be over dependent on their lecturers on various matters of their projects. From choosing the title, searching for information, verifying as well as evaluating information gathered and even in using of search terms to search on the Internet or any online databases. Among their comments that show dependence on their lecturers/supervisors are as below:

"My lecturer recommends the search terms" (R1)

"Sometimes I could not get enough information, so I ask him (supervisor) whether it is enough" (R8)

"She suggested the topic, so most of the information, 90% I took from her (R13)

Although most informants seemed dependent on their lecturers for answers and help, some informants do display confidence and self-reliance. They would try to do to their best and will only request assistance when necessary. Informant R10 explained, "Actually we need to ask ourselves what we need, not always depend on lecturers" and R2 said "I think I will try my best first, if I really cannot make it then I ask the lecturer".

(e) Friends

From Table 1 many of the informants listed friends or seniors as one of their sources of information for their Final Year Project. They depend on friends during most of the phases of the project, from selecting the title, selecting the supervisor, looking for information and writing the proposal. They felt at ease with friends since they could talk to them about anything and at anytime of the day, especially during the evenings. They look high upon their seniors that can always guide them through the mechanics of doing the Final Year Project. Most importantly, the informants felt that their friends are non-judgmental and would go out to the extreme length to help them. These friends were mostly their former classmates and their seniors, who are currently working at places where they had undertaken their industrial training the semester before. The only differences among these informants are the degree of dependence. Some only seek for advice on certain matters, but some do get help throughout the whole project cycle.

(f) Journal Articles

Journals are known to provide the most up to date information on any area of study. There are many titles available in the field of Computer Science and Information Technology. Few of the informants indicated that they used articles from journals, when gathering information. For some of the informants' journal articles were sources in printed formats. Since all of them search the Internet for information they would have read through all the web pages retrieved, which included sites from universities, research projects, development organizations and online journals. These sites also contained many journal articles. Informants seem to trust these articles because they had found them through the Internet. A numbers of informants do realized that the articles that they used were articles from reputable journals. They also felt that the information is trustworthy since it was published in reputable journals. They do know that an article goes through various scrutiny and editing processes before it gets published. Some of the informants do not realize this until they were told. In relation to this, informants were asked, why they do not just search the online databases provided by the university's library. Some informants do not know about

this and those who knew commented that searching the online database was cumbersome. For them the searching mechanism is not user friendly.

(g) Surveys and Interviews

The final year project allowed the informants to utilize various methods in gathering information for their projects. In certain cases, surveys and interviews seem to be the most appropriate mechanism in order to gain information required to design the system proposed for their projects. Figure 4 indicates that some informants do use these methodologies apart from getting information from the Internet, past years' reports and books. Informants R9 and R13 distributed questionnaires to their target audience via e-mail, while R3 and R11 distributed their printed questionnaires to a small number of randomly selected respondents.

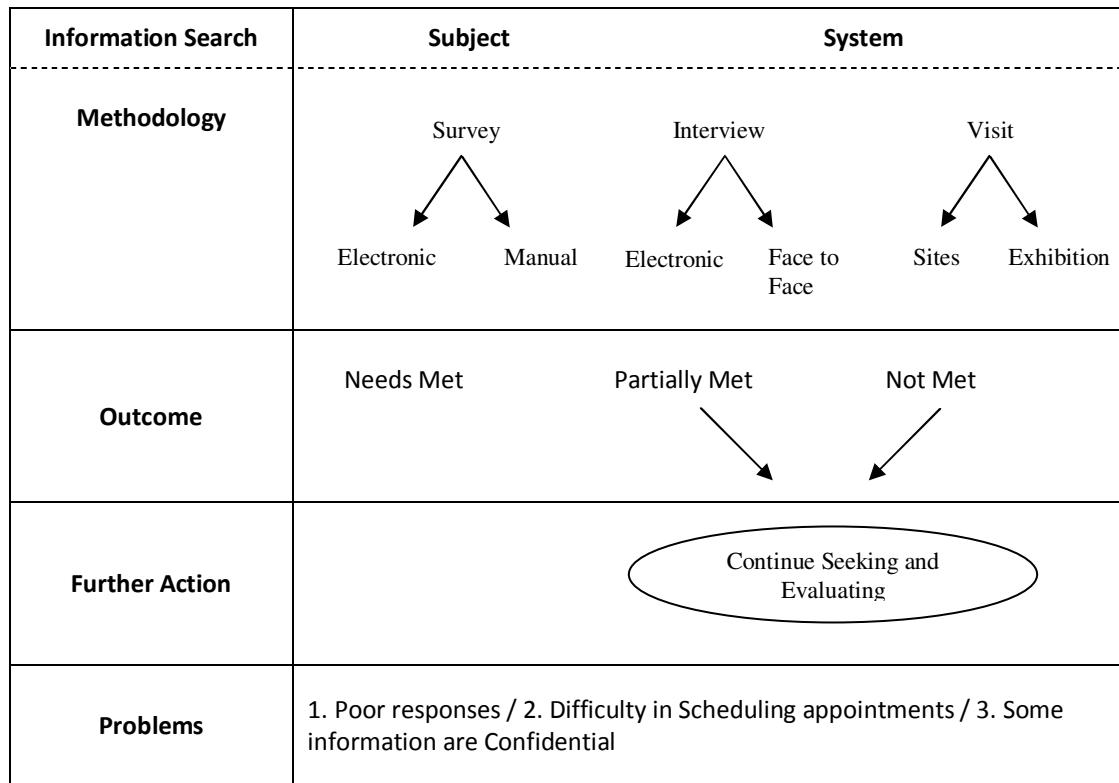| Information Search	Subject	System
Methodology	Survey → Electronic / Manual	Interview → Electronic / Face to Face Visit → Sites / Exhibition
Outcome	Needs Met Partially Met Not Met	
Further Action	Continue Seeking and Evaluating	
Problems	1. Poor responses / 2. Difficulty in Scheduling appointments / 3. Some information are Confidential	

Figure 4: Information search and use patterns when using survey/interview/visits

Informants learned how to conduct surveys to gather information through various ways. R11 explained that she learned to conduct her questionnaires through her reading of the previous final year reports. For R9 she learned from her "System Analysis and Design" course while R3 indicated from her "Expert system" class. Although the sampling techniques used were not appropriate in research procedures, informants seem happy that they were

able to gather pertinent feedback for their system design. They considered the respondents of their questionnaire as their end users and these feedbacks were regarded as crucial.

Several informants, in their quest to gather information about their end user needs and requirements, carried out face-to-face interviews. Informants R3, R6, R7, R8, R12 and R13 realized that the best way for them to be able to understand how the systems that they were proposing should function, was by interviewing the end users. They learned this from their "System Analysis and Design" course. Although they were able to gather information from the interviews, getting some specific details sometimes proved to be difficult. These were due to various reasons such as most of their respondents do not treat them seriously, especially when they introduced themselves as students doing a Final Year Project. Getting a second round interview to obtain more information was more difficult for some of them. Some were only able to interview clerks and not the officers' in-charge because some organizations do not wish to reveal certain work processes.

Despite all these problems, some informants still felt that they could gain a lot of information from interviewing the end users. R7 indicated her best source of information as follows, "The source, I think best is probably the interview because that's where you can get real data, know how the system should really function, because at the end of the development of my system, these people are going to be the end user". Figure 4 illustrates how surveys and interviews act as source of information for informants. Due to all the hindrances mentioned above some informants do not wish to conduct interviews especially if it involves professional people. R11 initially wanted to interview some doctors but put it off because she was asked to send her proposal and a letter seeking approval and this would takes time. R3 tried to e-mail some experts but she did not receive any response.

(h) Visits
In order to visualize the system they were proposing, some of the informants such as R3, R7, R8 and R12 visit exhibitions or sites that were able to given them better insights. They understood from their 'System Analysis and Design "course and other courses too, that a visit was a good method of obtaining information. Some of the informants felt that such visits were very useful, especially when they were able to ask questions and get answers, although not all of them were able to get the cooperation from the sites visited. Figure 4 illustrates how visits can be a source of information for informants.

(i) Sources of Information Least Utilized
This study also found that many potential sources especially those provided by the library were not popular with the informants. Only one informant used the CD-ROM while very few used the online resources that the library provides through its' portal. Since most of them do not visit the library often, the CD-ROM collection was hardly utilized. The online databases were mostly on the campus network, so searching can only be carried out on campus. Informants also claimed that the searching method and procedures of the databases is not user friendly. This leads to the preference of using the Internet. Table 1 also indicates that none of the informants use indexes, abstracts or government information.

Some informants explained that they do not know what the indexes and abstracts are use for, but those informants that understand the use do not see the use of these for their projects. They would rather get the information directly than go through any indexes or abstracts. Informants also indicated that they do not need government information for their Final year Project.

Evaluation of Information

During the process of gathering and using information for their project, informants looked at various resources. Some felt being overloaded with information while some complained of not being able to gather enough information, or indicate a feeling of uncertainty. Basically informants need the ability to evaluate the information, to decide which are useful as well as synthesizing the information. The informants from this study indicated using various criteria of evaluation. Among the criteria, which the informants apply, are as in Table 3.

Table 3: Evaluation of information

Evaluation criteria	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	Total
Compare with other sources	X	X	X	X	X	X	X	X	X	X	X	X	X	X	14
Lecturers/Supervisor	X	X		X	X	X	X	X	X	X	X	X	X	X	13
Friends		X		X	X	X	X	X	X	X	X	X	X		11
Integrity/authority of authors, editors, publishers	X	X	X	X		X	X		X		X	X		X	10
Check the date		X	X	X					X			X		X	6
Compare with lecture notes									X	X		X	X		4
Compare with well known projects		X	X	X											3
Information contains references		X							X						2
Refer to authentic sources like reference text, reference given							X								1
Try the coding (programming)					X										1
Own Analysis						X									1

Table 3 shows that all the informants would compare information that they had obtained from several sources. For them it was very important to verify that the information obtained were correct. Informants were careful with the authority (author and publisher) from whom they have obtained the information. Some would check the authors or publishers of the information. Even when looking at web pages they will only look at .edu or .ac sites. They

know that these addresses belong to educational institutions that were credible and authoritative. When asked how one verifies whether information from the Internet is correct, up-to-date and not bias, R2 explained, "Do not trust a particular web site at a glance. I would browse through a collection of web sites, and then I would decide which websites are reliable and not bias. I would compare the information on the Net with certain books to make sure that the information is correct". R6 felt that wherever possible one must be able to perform their own analysis and conclusion, "I look over several resources; I never trust one single resource especially from the net. If the information, which I found from several contents, is similar, then I suppose the information is reliable, up to date and not bias. I also read about what others have to say about the topics. From people's ideas and so called trusted sources they have written, I analyse and form my own conclusion".

Most of the informants would also verify information they obtain with their supervisors. They would also try to get help from friends, but endorsement from their supervisors was very necessary. R5 reiterated, "I always go and ask other people's opinion and the most important is my lecturer's opinion". Informants would also compare with previous lecture notes and to well known projects. None of the informants referred their project or get opinion from experts. They considered their own lecturers/supervisors as the experts.

The Utility of Libraries and Librarians in their Search

Libraries have been established to facilitate students' academic pursuits. During their Final Year Project, students are expected to utilize the libraries and its services. Informants do not find the university library and its services of help to them. Informants like R8, R9, R12 and R13 clearly indicated that they do not use the library for their Final Year Project. They claimed that the information that they require cannot be found in the library. R8 explained, "It's time consuming, the books you are looking for are not in the library". Most of them said that the library's collection is not up-to-date and the condition of the library does not attract them to go to the library. R9 commented "the condition there is too quiet".

R1, R2 and R7 indicated that when using the University of Malaya Library they were able to find books and other materials that fulfill their needs in the library. Unfortunately they also reported that there were too few titles and some of the books they want were often borrowed by others or could not be located on the shelves. Some informants used the library, not to get information but as a good reading or study place. R10 said that occasionally she tried to find the books that she needed but failed. Although it was available on the OPAC, she could not locate them on the shelves. During one of the interviews she said, "Honestly, during these 3 years in campus, I always go to the library, but seldom use the facilities. I just go inside and read my own book. There is not enough reference materials for me as an IT student".

Although some of the informants are aware of the inter-library loan facilities and document delivery services, none utilized them. The reasons given were that it takes a long time and they need the materials urgently. They recommended that the library should acquire new

titles in their field as fast as possible. Some informants were not aware that the library offered these facilities. When told that they have been briefed about all the library facilities and services during their first year and during their year one Information Skills class, they responded that they had forgotten and they should have been reminded about all these services. Informants were asked how the library could help them for their Final Year Project. Some of the responses were negative and showed little understanding of the functions and services of the library. Among the responses are:

"I do not see how" (R1)
"Get more books" (R2)
"Probably more books, journals and other reading materials" (R7)

However, there were informants like R5 who wished that the library could help by teaching them how to look for information. This highlighted the issue that informants do not understand the function of the library and the librarians.

The University of Malaya library has extensive library services for its clientele. The students were encouraged to approach the reference desk or the Research Division for any information enquiries. From the 14 informants, only one informant discussed her information needs with the librarian. Among the reasons given as to why the librarians were not approached for consultation were; that the librarian on duty always looked busy that they do not wish to disturb them. Informants also felt that the librarians cannot help them as their subjects were technical and the librarians do not know their field of study. R1 explained, "for the librarian, if the term is general, maybe they can help but if the term is technical, I do not think so".

Ethical Use of Information and Intellectual Property

Informants from this study gathered information from various sources such as books, previous Final Year Reports, on line journals and especially information from the Internet.. During one of the online interview informants were asked to explain the term "plagiarism". All informants seemed to understand the term well enough to explain them although it is obvious that some took the trouble to give the definition that they have obtained from dictionaries and they admitted to doing so. They maintained that they understood them and justified their actions by saying that copying the definition is much easier than explaining it in their own words.

Informants were also able to explain the difference between "fact" and "opinion". These further strengthened the belief that all informants were aware that plagiarism is wrong. They also understood the importance of bibliographic citations. They claimed that they had learned how to cite references by looking at previous reports; from books or from their lecturers. Not many respondents said that they learned from the information skills course. Respondents were all in agreement that they must cite the references they used. All informants have undergone a one-semester course on cyber law. Understanding intellectual

property and copyright laws should not be in question. All of them agreed that they must observe ethics in using the information for their Final Year Project.

Contrary to this, all 14 informants admitted to using pirated software and condone its usage for their academic work. The reasons were various, from high price of original software, saving of time, using for education purposes as they indicated in the following responses.

"Original softwares are too expensive, if I fully depend on the original one, a student like me can never afford them. I have to use it or I will never learn Computer Science" (R1)

"We cannot afford original software, after all it is not being use professionally" (R4)

"Cheap and it is normal to use in education" (R4)

"I think it dos not matter when compared to if use by a company" (R13)

"As long as it is not for commercial use "(R10)

"Students are not developing actual system" (R12).

Although informants admit that they had been using pirated software they seem aware of the consequences. They understood and reiterated that in the future when they are working or running their own business they will use licensed software. They knew that the quality of originals is better and it comes with warranty and upgrades. They know it is a crime as from the following responses:

"I do feel for those who gets hurt as a result of this, such as Software Company, singers and movie Production Company" (R2)

"If I am working in a company or having my own business later, I will get the original because the original is more stable and safe with certain additional benefits" (R6)

"It is a crime; it is not fair for the developer" (R2)

All the informants believed in the copyright law and safe guarding of intellectual property. After all they will also be in the business soon. What is worrying is the "*tidak apa*" {could not care less} attitude or apathy among the informants. As aptly said by R9 and R8, they all understand it, but nobody is following the laws, they believe all the students in their faculty are using pirated software because of the price and the availability of it.

CONCLUSION

This study has enabled an understanding of the information search and use process; understanding respondents' awareness of copyright and intellectual property and their opinions on library services. Through the diary entries, online and face-to-face interviews, various facets of these issues were discussed thoroughly by the informants. The 14 informants' come from different ethnic background and gender were able to share their thoughts and experiences while carrying out their Final Year Project. They shared their selection process of research topic, the information sources used and the criteria's used to evaluate the information gathered. Throughout the interviews informants were very honest and frank about their thoughts, opinions and practices on the legal issues of copyright and intellectual property, the library and its services. As undergraduates, informants seem to realize the importance of being information literate, not only for academic purposes, but also as a necessary competency to be successful in their careers and life in the present day environment. Informants do not think highly of the library and the librarians, and do not fully understand the functions and services of the library or how they can utilize the services of a professional librarian. These misconceptions should be addressed. This research also represents one of the many information seeking studies. Most of these research done in library and education setting indicates that information sources used are wide ranging and almost all information seekers consult friends and families (Ernest, Level and Culbertson 2005).

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