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Article

Information Seeking Behaviours of Business Students and the Development of Academic Digital Libraries

Joyline Makani
Dalhousie University
Killam Memorial Library
Halifax, Nova Scotia, Canada
E-mail: makani@dal.ca

Kelli WooShue
Halifax Public Libraries
Spring Garden Road Memorial Public Library
5381 Spring Garden Road
Halifax, Nova Scotia, Canada
E-mail: k_wooshue@hotmail.com

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Abstract

Objectives - To gain insight into the extent to which user information-seeking behaviours should inform the design and development of Digital Libraries in an academic setting, a study was carried out at Dalhousie University, Canada to explore the information-seeking behaviours of business students.

Methods - The students studied were drawn from the School of Business Administration at Dalhousie University, Canada. The study was based on qualitative and quantitative data collected through a survey, in-depth semi-structured interviews, observational study and document analysis. Qualitative case study data was coded using QSR N6 qualitative data analysis software. The data was categorized using Atkinson's "Model of Business Information Users' Expectations" and Renda and Straccia's personalized collaborative DL model. Atkinson's model defines the expectations of business students in terms of cost, time, effort required, pleasure and the avoidance of pain. Renda and Straccia's model of a

personalized and collaborative digital library centres around three concepts: actors, objects, and functionality. The survey data was analysed using the Zoomerang software.

Results - The study results revealed that students tend to select resources based on cost (free or for fee), accessibility, ease of use, speed of delivery (of results), and convenience. The results showed that similar to Atkinson's findings, the business students' information-seeking behaviour is influenced by the concepts of cost-benefit and break-even analyses that underlie business education. Concerning speed of delivery and convenience, the organization of the resources was paramount. Students preferred user-defined resource lists, alert services, and expert-created business resource collections. When asked about the usefulness of potential digital library functionalities, students valued a personalized user interface and communal virtual spaces to share information and communicate in real-time with their peers.

Conclusion - This study reveals that when digital libraries are developed, user behaviours and needs should be taken into consideration. It demonstrates that the activity as well as the "user's orientation and motivation" (here the business student training) can directly influence the design and use of a digital tool. In other words, this study confirms a new typology of a business digital information user or use behaviour, one that requires the building of dedicated accredited library research systems. Providing information and information tools tailored to this specific audience is more likely to increase the appeal and use of an academic business digital library.

Introduction

There is a wealth of research on the development of digital libraries, particularly regarding information retrieval and technical considerations. However, very few researchers have focussed on how information is sought and transformed into knowledge and how this should influence digital library design. In this study a simple definition of a digital library is used, that defined in the Dictionary of Human Geography as, "a system providing the services of a library in digital form." Digital libraries therefore, are not simply collections of digital versions of existing resources. As Covi and Kling observed, effective digital library design requires an understanding of how users do their work, how they use information, how they create knowledge, *and* how digital libraries support these processes. Just building a digital library would not be enough; the digital collections, storage, and transmission should be useful to people who use them. (672) Research on undergraduate students indicates that they are increasingly able to use digital resources even though they are not necessarily information literate. (Lombardo and Miree, 6) It is critically important that digital libraries help improve the transferable information literacy of students.

This study was conducted to provide new insights on information seeking behaviours of business students, exploring implications of these findings to the development of business digital libraries. The research project examined and analysed how business students learn, gather, and use information individually and collectively, and how they share their work. The study was based on qualitative and quantitative data collected through a survey, in-depth semi-structured interviews, document analysis, and observational study of business students at Dalhousie University as they perform group research tasks. The recommendations that emerge from this study could form the basis for best practice

guidelines for effective business digital library design in the academic environment.

Literature Review

Information-seeking behaviour Research

Two information-seeking behaviour models from the library and information science literature inform this study and provide the theoretical foundation.

Atkinson provides insight into the motivations and expectations held by business information users who seek information. While it utilizes the key elements identified in other traditional information-seeking models, Atkinson's "Model of Business Information Users' Expectations" (MBIUE), addresses the characteristic needs of users of business information and their associated optimizing behaviour. (61) He suggests that the background and training that business people undergo in cost-benefit and break-even analyses motivates them to apply this conceptual model to the search for information. The business user seeks to optimize the value of the information retrieved in relation to cost, time, or effort expended. Atkinson emphasizes the value of this model to designers of information retrieval systems and reference librarians. However, the shortfall of this model is that it is based on hypothetical relationships and not on any empirical research. As a result, few authors have used or cited Atkinson's MBIUE. Despite this, Atkinson's model is one of the few that provides an analysis of user behaviour specific to business information users.

Allan Foster emphasizes the significance of context to understand information-seeking behaviour. (228) Foster observed that "information behaviour is not isolated from the context within the information seeker works." (232) He identified external factors such as social and organizational, time, the project, navigational issues, and access to sources as influencing the information seeking process. Foster's model, although based on the study of interdisciplinary information seekers, provides a concrete platform for a holistic approach to the understanding of information-seeking behaviour. "The Nonlinear Model of Information-Seeking," with its identified "core processes of Opening, Orientation and Consolidation", illustrates the process of information-seeking in a way that reflects the experience of information seekers and offers applicability to business information user studies. (Foster, 228) As Maureen Mackenzie noted in her study of the behaviours of line managers in information-gathering, "much of managerial work is not linear. Managers will make rapid decisions, jump from task to task and bypass a formal search for information when problem solving." (1) This is a useful observation especially when one seeks to understand the behaviour of academic business information users who are in general undergoing training to be future managers.

Digital Library Research

Earlier approaches to the development of digital libraries have been characterized by a "build it and they will come" philosophy. (Greensten and Thorin) This approach was viewed as acceptable at the time since most of the digital library projects were carried out as "road tests" for bigger projects to come. Recent studies have emphasized the need to involve the user from the initial stages of a digital library development. Greensten and Thorin noted that "as the integration of the new technologies begins to transform the libraries and the possibilities for constructing innovative network services, libraries see a pressing need to engage users and to reassess their interests and needs."

In the same line of thought, Renda and Straccia observed that thus far, digital libraries have been oriented towards a generic user and provide no or poor support to individuals or a defined community of users. (5) To them, digital libraries "answer queries crudely rather than, for instance, learn the long-term or short-term requirements idiosyncratic to a specific user or, more general, specific to an information seeking task." Thus, they concluded that, "The growing diversity of Digital Libraries (DL), the communities accessing them, and how the information is used requires the next generation of DLs to be more effective at providing information that is tailored to a person's background knowledge, skills, tasks, and intended use of the information." Renda and Straccia have developed a model of a personalized collaborative DL. Their model defines a DL "not only as an information resource where users my submit queries to satisfy their daily information need, but also as a collaborative working and meeting space of people sharing common interests." (5)

David Nicholas et al. introduced new ways to characterize and categorize the information-seeking behaviour of the "digital information consumer." (24)Their study dealt with large populations of web users from which they developed a "typology of digital information users or use behaviour." They presented a new form of information-seeking behaviour which they characterized as bouncing or flicking. Their results show that "users seldom penetrate a site to any depth, tend to visit a number of sites for any given information need, and seldom return to sites they once visited." For this type of user, Nicholas et al. concluded, information providers should not be thinking of building dedicated "accredited" systems or gateways. Is this true for business information users or does this group of users need dedicated, personalised gateways they can identify with as business specific for their research?

Methods

Group Study

The data was collected at Dalhousie University in 2005. The study recognized that business program students at Dalhousie are often required to work in groups or in teams and thus this collaborative dimension is fundamental to the design of a digital library. We were interested in exploring the physical characteristics of collaborative information seeking behaviour by studying students as they performed group research tasks. Thus a qualitative case study was conducted. As the students were involved in a highly interactive and contextually sensitive decision-making process, qualitative techniques were determined to be appropriate for highlighting the themes, processes, and cognitive behaviours of the students. (Hepworth, 695) The primary methods of data gathering were in-depth semi-structured interviews, observational study and document analysis.

As defined by Patton the study sample for the group study was purposively selected since the focus was to understand and illuminate the behaviour of business students as a case rather than to generalize from a sample to the general population. (Foster, 228) The authors drew up a checklist to determine which type of courses the student sample could be drawn from. The first requirement was that the students were enrolled in courses that had group assignments that required considerable research and the processing of large amounts of information using information technology. Groups of students with different years and levels of academic study were of interest in order to gather a variety of perspectives on the behaviours of

the business student, thus the inclusion of students from both undergraduate and graduate courses. Recruitment of the participants was by requesting for volunteers in selected business classes (that met the above requirements). Participants who volunteered to take part in this study were guaranteed anonymity.

The group study was carried out from January to April 2005 and followed three groups of business students working on group project assignments. The participants in the group study included ten undergraduate students in the Commerce/Management program and five graduate students in the MBA program. The undergraduate students worked in two groups of five while the graduate students were all in one group. For both the undergraduate and graduate courses the project assignment was a mandatory part of the course and was carried out in 10 weeks, from the end of January to the first week of April. The assignments involved formulating a topic, searching for information and writing and submitting a group project report.

Interviews were conducted with each group of students at the beginning and end of the project. The purpose of these interviews was to focus on the issues that could not be addressed through observation only. This offered the investigators an opportunity to "explore the experience of the participants and to elicit, by probing, new themes as they emerge." (Foster, 228) For example, the participants were asked about how they conduct research or share research information in groups. The interviews were not tightly structured but used a set of outlined guidelines and points to ensure all important factors were captured. (Appendix A) The interviews were tape recorded. The tape recordings, which were transcribed verbatim, served as the primary aid to our memory.

The investigators were present as observers when each group met to work on the project. To ensure consistency in observation data the primary investigator was present at each of the groups meetings. Based on the insights gained in the first group interviews an observation item checklist was created. (Appendix B) The purpose of the checklist was to ensure observers would not miss important items and also to establish a certain level of consistency in the items observed. Field notes were taken during each meeting. Also, all emails sent by group members relating to the project were copied to the primary investigators.

Document Analysis

The data from the documents collected in the group study, i.e. field notes, email documentation and interview transcripts, was coded and analysed using QSR N6 qualitative data analysis software. In order to analyze the documents data a set of tags or categories were created which would allow each of the comments or responses to be coded individually with as many tags as appropriate. We categorized the data using Atkinson's "Model of Business Information Users" and Renda and Straccia's personalized collaborative DL model. Atkinson's model defines the expectation of business students in terms of cost, time, effort required, and pleasure and the avoidance of pain. Renda and Straccia's model centres around three concepts: actors, objects, and functionality. In our study, the *actors* were the group of business students at Dalhousie and their community of peers, professors and experts; the *objects* were the information resources used by the students and the organization of those same resources; and the *functionality* was how the students use, communicate and/or share the information. Documents were first analysed in the context of the rest of the same observation notes, emails or transcripts. Connections between documents were then

examined. Finally relationships between and among categories were analysed.

Survey

To corroborate the information gained from the qualitative data and fully understand the behaviour of the business information user in an academic setting, the data from the group study was compared to data collected from a web-based survey of full-time students enrolled at Dalhousie in the MBA and Commerce programs. The survey, which ran from January 5 through March 2, 2005, addressed a number of topics: their computer experience and use, their experiences locating and organizing information, their research skills, their preferences for potential digital library features, and demographics. 105 of the 212 students who visited the survey page completed the questionnaire. Five partially completed surveys were also submitted. Data from the survey was analysed using the Zoomerang software.

Results

Demographics

105 business students completed the survey and the group study had 15 participants. The age of the participants (survey and group study) ranged from 18 – 45 years. 74% (n = 89) of all participants were undergraduates and 26% (n= 31) were graduates. Most of the undergraduates were between 18 and 25 years of age (95% n = 85), while 56% (n =17) of graduate students fell within the same age range. In terms of computer experience/use, the majority of the participants had used computers and the Internet for more than 7 years [92% (n = 110) and 63% (n = 76) respectively].

Most of the graduate students (63%, n = 19) had received prior library research instruction. Among the undergraduates, about half indicated that they had received library research instruction. The instruction was delivered by librarians or obtained through self-guided methods. Most of the participants rated their information research skills as good, although they sometimes experienced difficulty finding the information they need.

Actors

The study results show that business students frequently interact with others when seeking information. In the survey and group study, students mentioned that they often consult with their peers, professors, teaching assistants (TAs), and experts in relevant fields during the information seeking process. The document analysis showed that among these contacts, peers (classmates) are considered particularly important (mentioned in 4.5% of all lines coded). Survey results corroborate this trend as shown in Table 1 below.

	Not Important	Somewhat Important	Important	Very Important
Importance of Peers	2%	13%	38%	47%

Table 1. Importance of peers when completing assignments

	Graduate	Undergraduate
Consult your textbook/class notes	16.7%	15.6%
Browse the Business section of the library stacks	0%	0%
Talk to a librarian	0%	0%
Talk to your classmates	0%	3.9%
Search Google (or another similar search engine)	37.5%	63.6%
Go to the library's Business subject page	4.2%	1.3%
Search the library's online catalogue (Novanet)	12.5%	5.2%
Search a Business database	20.8%	9.1%
Other, Please Specify	8.3%	1.3%

Table 2. Starting point for locating information

Objects and Functionality

As already mentioned above *objects in this study* refers to the information resources used by the students and the organization of those same resources; and the *functionality* denotes how the students use, communicate and/or share the information.
The strategies for seeking and sharing information and the resources accessed by the students showed some interesting similarities among the participants, as demonstrated by their preferences for specific information sources. In the group study regardless of their status (i.e. graduate, undergraduate), business students were most likely to search Google (or another similar search engine) as the initial step in their information seeking process.

Table 2 shows the survey participants' responses when asked how they would begin locating information for their topic. The preferred starting point for both undergraduate and graduate students is Google or another similar search engine although it is significantly higher for undergraduate students. Although Google is selected as the starting point by 37.5% of the graduate students the library and its resources continue to play a significant role for this user group. A significant proportion of the graduate students selected library related resources as their starting point, i.e. business databases (20.8%) and the Library's online catalog (12.5%).Textbooks and class notes are similarly used by both groups. Interestingly neither group talks to librarians when first seeking information. It is also important to highlight the relationship between actors and objects in the table below by noting that for undergraduates peers or classmates play a somewhat important role as a starting point in their information seeking process.

When asked how they communicate with their professors and peers, the participants mentioned e-mail more than any other mode in both survey and group study. In the qualitative data, e-mail was found in 15% of the lines coded as shown in the report summary (Fig. 1) below.

Email and printing were identified as the main functionality tools used by students to organize and share the information they collect during the research process.

Report Summary from QSR6 Document Analysis

(F 12) //Free Nodes/Communication (e-mail|email|mail)
++
+++ Total number of text units retrieved = 201
+++ Retrievals in 7 out of 7 documents, = 100%.
+++ The documents with retrievals have a total of 1341 text units, so text units retrieved in these documents = 15%.
+++ All documents have a total of 1341 text units, so text units found in these documents = 15%.

Figure 1. Report summary

It should also be noted that in 13% of all document text lines, objects and functionality were discussed in the context of collaboration, indicating a noteworthy relationship among these concepts. Survey data also supports this observation. (See Table 3) It is evident that students strongly associate the usefulness of an object with functionalities that facilitate collaboration.

It was evident from both survey and group study data that librarians continue to play a significant role in the information seeking process despite not being perceived as a useful starting point when looking for information (Table 2), The data presented in Tables 3 & 6 show that librarians are a valued resource in the digital information seeking process. In Table 3, "*online reference service that allows you to communicate with a librarian in real time"* was selected as a useful DL feature by 66% respondents. and Table 6 shows that "*organized resource collections, (e.g. by subject, topic, or librarian selections)"* were ranked as very useful by 55% of the students.

Cost

Cost is a major factor determining the students' preference and use of information sources. This was evident from students' statements in the group study interviews.

Feature	Useful – Very useful
discussion forums for exchanging information with others	66%
community folders that allow you to share data and saved searches	80%
online reference service that allows you to communicate with a librarian in real time (e.g., chat/instant messaging)	66%
online meeting rooms that allow you and your members to collaborate in real time	71%
Web-based collaborative software that allows you and your group members to read/edit Web content	63%

Table 3. Usefulness of Digital Library Features

	Not important	Somewhat important	Important	Very important
No fees associated with the resource	0%	5%	18%	77%

Table 4: Importance of Cost when Selecting Resources

For example,

> *"I use ... As I said, I use ProQuest and Google, which everyone uses. I think Google Scholar I tried a couple times cuz I heard from Professor X about it. I though it was pretty interesting especially because it was for free and ProQuest, we only use it because it's provided by Dalhousie. If we had to pay for it, I wouldn't use it. I'd go for Google Scholar most."*

From the survey, 77% of the respondents regarded "no fees associated with a resource" as a "very important" factor in their selection of information resources. (See Table 4)

Time

For business students, time is an overriding consideration at all stages of the information seeking process as revealed in both the group study and survey results. A transcript analysis identified inferences to time in most of the documents. Time affects the format and type of resource used to search for information, the way in which the information is disseminated and organized, and the creation of knowledge. For example, the students in the group study noted a number of shortcomings associated with e-mail (e.g., slow response times) which accounted for their continued use of other communication modes, namely telephone, chat, and discussion forums. (See Figure 2)

Effort Expended / Pleasure and the Avoidance of Pain

The amount of effort expended and perceived ease of use are two important criteria for students when selecting research tools as captured in the following quotations.

> *"To tell you the truth, I always get what I wanted out of Google without putting the quotes and all that stuff."*

> *"... but it's not quite as convenient as [???] or whatever. You go in to WebCT, then you have to go into the forum, then you have to [???]. I don't know, it's kind of a hassle. Just like course mail, it's not as convenient…"*

> *"A strong and easy to use search engine. Articles linked to search engine using keywords rather than only titles. This would make searching for articles with a specific theme very fast and easy."*

These sentiments are corroborated by the survey results. (See Table 5). As previously mentioned, Google is preferred by most participants. When asked about this preference, the students explained that when they try to use library databases, they often have difficulty identifying appropriate search terms. With Google, they can enter the little bit of information that they have

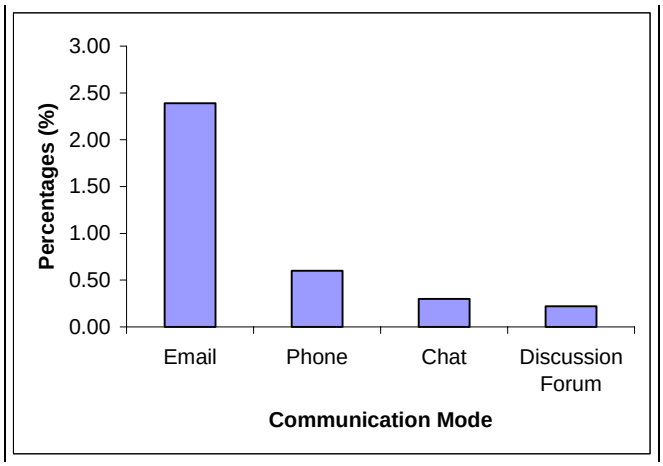

Figure 2. Modes of communication

	Not important	Somewhat important	Important	Very important
Online availability of an article in fulltext	0%	5%	28%	67%
Ability to access electronic resources remotely (e.g., from home)	3%	5%	13%	79%
Ease of use	0%	9%	28%	63%

Table 5. Important factors when selecting information research tools

and immediately get numerous relevant results. Below are statements made by two students.

> *"I usually need a trigger to get started. Just something … I don't know. If I'm trying to do a research paper on something but it's kind of a general area, I'll need a specific word to trigger it so then I'll use the word in a search and that will get me all the information I need."*
>
> *"Or even some place, some kind of database or something where you can go and there would be all these different main topics that are obvious but also talk about subjects that talk about say ethics and business. Say for example I've got to do a paper on some ethical issue in business, and then maybe there could be some kind of database that says advertising but then it goes off into each … all these ideas about advertising like about cigarette like tobacco advertising, or advertising beer, or you know what I mean, stuff like [???] advertising so you have all these subcategories so you can kinda break it down and find the actual topic."*

	Not Useful	Somewhat Useful	Useful	Very Useful
a user interface that you can personalize according to your preferences	10%	24%	32%	33%
discussion forums for exchanging information with others	7%	28%	41%	24%
the ability to save/archive your searches for future use	0%	5%	34%	61%
community folders that allow you to share data and saved searches	3%	18%	46%	33%
personal folders that allow you to organize your own information space	1%	4%	24%	71%
an alert service that sends you information based on your predefined preferences	4%	23%	40%	33%
organized resource collections, (e.g. by subject, topic, or librarian selections)	1%	7%	37%	55%
user-created resource collections (e.g., Favorites/Bookmarks)	1%	13%	44%	42%
online reference service that allows you to communicate with a librarian in real time (e.g., chat/instant messaging)	8%	24%	42%	26%
online meeting rooms that allow you and your members to collaborate in real time	8%	21%	31%	39%
Web-based collaborative software that allows you and your group members to read/edit Web content	6%	30%	41%	23%

Table 6. Useful digital library features

Useful Digital Library Features

When asked about the usefulness of potential digital library features, students overwhelmingly valued having personal folders and communal virtual spaces that would allow the students to share information and communicate in real-time with their peers. Concerning speed of delivery and convenience, the organization of the resources was paramount. Students tended to prefer user-defined resource lists, alert services, and expert-created business resource collections. Some of the DL properties desirable to business students are identified in the table below.

Discussion

This study reveals that for effective business digital library design, an understanding of how the targeted users do their work, how they use information, and how they create knowledge is essential. To ensure a DL's maximum utilization by business students, the DL should be built not only as an "information resource where users may submit queries to get what they are searching for, but also a collaborative working and meeting space" (Renda and Straccia, 719.).

Also, in this study, business user behaviour concepts of "optimization, cost/benefit and break-even analysis" as modeled by Atkinson are affirmed. Similar to Atkinson's findings, the business students' information-seeking behaviour is influenced by the concepts of cost-benefit and break-even analyses that underlie business education. The students' first step in the information seeking process -- whether they realize it's their first step or not -- is identifying the best resources in terms of cost, effort, convenience, and time. Thus, a business digital library can assist students by providing tools such as the "community-based or social filtering technology" [that] harness the collective knowledge of all [participants] to make predictions about preferences" for their peers who share the same information needs. Examples of such tools include "multi-user virtual environments (i.e., MUVEs, a.k.a. MUDs and MOOs); and user-profiling and recommendation engines now used by Amazon.com". (Center for Innovation in Learning Technologies)

It should also be noted that this study has pointed to a very different typology of a digital information user or use behaviour than the paradigm of the digital information consumer developed by David Nichols et al., that of bouncer or flicker, who doesn't need dedicated, personalized systems. For the business information user, information providers should think about building dedicated, personalized systems the user can identify with as specific to their business research needs. Providing information and digital tools tailored to this specific audience is more likely to increase the appeal and use of an academic business digital library.

However this study has some limitations. The focus of this study on undergraduate and graduate full-time students means that the results can not be generalized across all business academic DL users. Studies exploring faculty and distance learners are needed to fully validate our findings. Also work task factors in relation to group members' information-seeking behaviour need to be further explored. More investigation is needed into the specific tasks performed as a group versus individual tasks in the information seeking process i.e. identifying, analysing, defining their information problems, searching for information and retrieving the information.

Conclusion

This study emphasizes that when developing digital libraries user behaviour and needs should be taken into consideration. It demonstrates that the activity as well as the "user's orientation and motivation" context (here the business student training) can directly influence the design and use of a digital tool. Both models, Atkinson's "Model of Business Information Users" and Renda and Straccia's personalized collaborative DL model, have been validated. From this study future Digital Library designers have a reference. The quotation below sums it up perfectly:

> *"I find the idea of the "real" library very time consuming and inefficient. I look forward to a virtual library that not only facilitates quick and easy access to information but also team and peer collaboration."*

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Appendix A
Group Interview guide

1. How do you approach the task of researching on a new topic? (How do you define your topic in the beginning? How do you draw together ideas?

2. How would you characterize the approach you take to solve the information problem?

3. Describe for me things that you do to find information? (Probe at each step for what you do/need/feel/think, where you look.)

4. What resources do you use to find business information? (e.g. databases, library shelves, web)

5. What factors play a role in your decision to use various sources?

6. How do you identify new or useful information sources? (When looking at a range of sources, how do you decide which ones will be worth using? / When looking at the results of a search how do you decide which results are relevant?)

7. What difference do you think there is between working on a research assignment in a group or individually? If it is different, why do think that is?

8. What are the biggest barriers/obstacles to gaining access to information?

9. How would you describe your process of information seeking: Is it as clearly defined stages or as many smaller parts or something else?

10. How do you communicate with each other? (Which media do you use? How do you collaborate with each other?

11. What would you recommend to someone starting on a similar assignment to improve his or her chances of finding relevant information?

12. Age, Gender, Academic status, Degree concentration, Academic background.

Appendix B
Group Study Observation Checklist

Use of Information sources
Note which sources they are using and mark which one they pick as a starting point for getting information for the project by using the number 1 e.g. Google, ABI/Inform Global, books, librarian, peers (people outside the group) etc

Sharing of information/ collaborating?
Note whether they email, print, or create web pages, save citations in Refworks

Communication among them selves or with people outside the group e.g. professors, librarians or TAs?
Note whether they email, chat, instant messaging, telephone, in-person

Aim of use of information sources,
Note whether it was for clarification, to understand a topic, to explore, or for final information search

How often are they in contact with other people outside their group?
Note frequency and with whom

The Information Seeking Process?
Note whether they have defined stages, perform research tasks as a group or they assign each other research tasks i.e. dividing the research process into individual portions etc.

The use of time, effort expended pleasure?
Note how much time they spend on each resource, frustration, joy (indicate words used to express these feelings)