A Multiple Case Study Exploration of Undergraduate Subject Searching:

Preliminary Report

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A common goal of undergraduate degree programs is to foster students' critical and creative thinking skills within a liberal education framework, the desired result being graduates who habitually make positive contributions to society through sound independent thought and action. Academic libraries advance this endeavour through instruction, programs, services, resources, and research tools that promote the development of information literacy competencies (Association of College and Research Libraries, 2000) underpinning the ability to think critically. A multiple case study was undertaken to probe one such information literacy competency – the ability to access "needed information effectively and efficiently" – by examining undergraduates' processes of subject searching for information in order to understand better the factors associated with successful subject searching.

In this study, subject searching is understood to be the process of looking for information with a subject or topic in mind. Subject searching is an important skill for academic success, but at the same time is known to present significant performance challenges for undergraduates (Colaric, 2003; Halcoussis, Halverson, Lowenberg, & Lowenberg, 2002; Long, 2000; Morupisi & Mooko, 2006; Young & Yu, 2004). This study explores whether detailed longitudinal information on academic course-related search behaviours, thoughts, and search results can shed new light on the pathway presumed to be traversed by at least some undergraduates as they progress from being inexperienced, to being more experienced and productive subject searchers. The goal is to identify and understand factors associated with undergraduates' development and performance of successful subject searching.

The present preliminary report describes the participants and data collected in a multiple case study conducted over the Fall 2005 and Spring 2006 semesters at a Canadian university. A complete report of the study and its findings is in progress and will be available at a later time.

Participants

At the university where the study took place, participants were recruited via an introductory memo from the Faculty of Arts and Science Dean's office sent to approximately 300 students on the Dean's Honour list[1]. Of the 40 respondents who indicated an interest in participating, 12 met the requirements of the study,[2] returned a signed letter of consent to participate by July 2005, and commenced participation in September 2005. Participation was limited to 12 students due to the limited number of laptops available to be loaned to participants for the purposes of data collection. Because of an early withdrawal, another interested and eligible respondent commenced participation in early October 2005. Nine undergraduates (7 women and 2 men) completed all study requirements by May 2006. Hereafter all references to 'participants' denote these 9 undergraduates.

Initially 6 participants were beginning a 4th year of undergraduate studies, and the other 3 were at the midpoint of a 3rd year, the beginning of a 3rd year, and the midpoint of a 2nd year of undergraduate studies. A similar distribution of differences existed for the year in which postsecondary studies were initiated: 6 participants had begun their studies 3 years earlier in September 2002, while the other participants had begun their postsecondary studies in January 2004, September 2001, and September 1996.

[1] To be on the Dean's Honour list, students at this university must complete four or more graded courses in one semester and achieve a grade point average of 3.75 or higher on these courses; the highest average possible is 4.0.

[2] Eligible participants were academically successful upper-level (preferably third- or fourth-year) students enrolled in courses toward an undergraduate degree during the fall 2005 and spring 2006 semesters.

Five participants were enrolled in Bachelor of Arts degree programs, 2 were completing Bachelor of Arts/Bachelor of Education programs, 1 was completing a Bachelor of Arts/Bachelor of Science program, and 1 was completing a Bachelor of Science program. Within those degree programs, 3 participants were majoring in English, 2 participants were majoring in Humanities, and the majors of the other participants were Sociology/Religious Studies, Sociology/Psychology, History, and Neuroscience.

Data Collection

A variety of data collection tools were employed to track participants' naturally occurring, course-related subject searching experiences over the course of the study. Some of the subject searching data were captured by participants using loaned laptops equipped with software applications provided by the investigator. Other types of data were collected in the form of questionnaires, interviews, and an online information literacy quiz.

Questionnaires:

- Participants completed an initial questionnaire that gathered demographic information and inquired about past experience in subject searching.
- Participants completed a final questionnaire that inquired about the experience of participating and changes in subject searching that may have occurred during the study.

Online Subject Search Demos:

- At three time points (roughly at the beginning, middle and end of the study) each participant selected a naturally occurring course-related need to engage in online subject searching, and performed the subject search while speaking their thoughts aloud with the investigator present to observe and take notes. For each online subject search

demo the participant's' spoken thoughts and all on-screen interactions were recorded using *Camtasia Studio*, a multimedia recording and production software application.

- Immediately after each demo the investigator conducted an audio-recorded focused interview with the participant to explore his/her thoughts, feelings, interactions and outcomes pertaining to the search demo. A transcription of each focused interview was prepared by a professional transcriber.

Online Quiz:

- An online information literacy quiz[3] was completed three times by each participant in WebCT (roughly at the beginning, middle and end of the study). Each quiz iteration comprised a slightly different set of 40 questions randomly selected from a database of questions on topics such as search strategy, online catalogues, library classification systems, reference sources, periodical indexes, citations of published research, and the Internet.

Diary Entries:

- Participants were asked to make a diary entry for all naturally-occurring course-related subject searching needs encountered throughout the study. All types of subject searching were of interest, including search activity that did not necessarily occur online or involve interactions with information resources in libraries. Diary entries were created using *Diary Client*, a custom-programmed application on participants' loaned laptops. Participants used *Diary Client* to create a date- and time-stamped record of each subject search being diarized through multiple-choice and free-text responses to a structured set of questions about the subject search.

[3] The online quiz was created by a librarian at the university where the study was conducted, and was adapted for use in this study with the creator's permission.

Screen Recordings:

- Participants used *Camtasia Studio* on their loaned laptops to make screen recording of all naturally-occurring course-related online subject searching that occurred during the study. Other than recording their search, participants were asked not to change any other aspect of their normal subject searching habits, techniques, and activities. It was intended that each recorded online search should have a corresponding diary entry.

Orientation and Debriefing:

- The investigator provided each participant with a private initial orientation to the study, as well as a private final debriefing that involved:
    - Participant completion of the final questionnaire
    - An interview (audio-recorded and transcribed by a professional transcriber)
    - Participant return of the loaned laptop and receipt of a small honorarium

Data Descriptions

a) Initial Questionnaire: Questions probed the types and extent of participants' subject searching experiences over the previous year, and self-assessment of their subject searching abilities. Responses indicated that almost all participants frequently conducted subject searching (at least monthly) and frequently used a variety of search tools. Only one participant reported using library online indexes/databases infrequently. The majority of participants indicated their subject searching abilities were very good and none indicated their abilities were less than moderately good. Responses are summarized in Table 1.

Table 1. Initial Questionnaire Responses

Question	Participant Responses			
	Extensive (Daily)	**Frequent (Weekly)**	**Frequent (Monthly)**	**Infrequent (Few Times/Year)**
Online catalogue use	1	6	2	
Library online index/database use	2	4	2	1
Internet search tool use	5	3	1	
Frequency of subject searching	2	6	1	

	Excellent	**Very Good**	**Moderately Good**	
Subject searching abilities	1	6	2	

b) Final Questionnaire: Completed at the end of the study, questions probed the amount of effort required to participate, whether or not participants noticed changes in their subject searching, and another self-assessment of subject searching abilities. All participants indicated that study participation required little or moderate effort. In general, participants indicated that not much (none, very little or little) change took place in their subject search approach or understanding over the course of the study. Responses show the greatest change in participants' understanding of subject searching occurred in searching library online indexes/databases. Although the majority of participants rated their subject searching abilities in the initial questionnaire as being very good, in the final questionnaire the majority rated their abilities as being moderately good (in general). Responses are summarized in Table 2.

Table 2. Final Questionnaire Responses

Question	Participant Responses			
	None/Very Little	**Little**	**Moderate**	**Major**
Effort required to participate in study		3	6	
Change in subject searching approach	1	5	2	1
Change in understanding of subject searching in library catalogues	3	6		
Change in understanding of subject searching in library online indexes/databases	5		3	1
Change in understanding of subject searching using Internet search tools	5	2	2	

	Excellent	**Very Good**	**Moderately Good**	
Subject searching abilities (in general)		3	6	
Subject searching abilities (in degree majors)	2	5	2	

c) Information Literacy Quiz : Participants completed the quiz 3 times, roughly at the beginning, midpoint and end of the study. Ranges and averages for overall scores are summarized in Table 3. While there was little change in the average scores over the first two quiz completions, the average for the third completion was slightly higher. In all but 2 cases, participants' final quiz scores were higher than their initial quiz scores.

Table 3. Information Literacy Quiz Results

	1st Completion	**2nd Completion**	**3rd Completion**
Average score	64.2%	64.4%	70%
Highest score	77.5% (2 participants)	77.5% (1 participant)	82.5% (2 participants)
Lowest score	52.5% (3 participants)	52.5% (2 participants)	55% (1 participant)

d) Online Subject Search Demos: The only imposed requirements for participants' demonstrated online subject searches were that the topics be course-related, self-

selected, and naturally occurring (i.e., not invented strictly for the purposes of performing an online search demonstration). In most cases participants chose to demonstrate online searches on subjects within their degree majors, but some chose subjects outside of their majors. Significant variation was observed in participants' degree of familiarity with the subject area of their demonstrated searches; in the amount and type of information sought; in the search tools, resources, and techniques used; and in the duration of demonstrated online searches which ranged from 6 minutes to almost one hour.

e) Online Demo Follow-Up Interviews: The investigator conducted a focused interview with participants immediately after each demonstrated online search to seek a better understanding of observed behaviour or spoken thoughts that were unclear, and to gather information about participants' knowledge of the subject area of the search, their comfort level with using different types of search tools, and their processes of determining the relevance, relative importance and overall success of their search results. Again, because of many different variables at play, the duration of these interviews varied widely, ranging from 12 to 40 minutes.

f) Diary Entries and Participant-Recorded Online Subject Searches:

   i. Diary Entries: The study required participants to make a diary entry each time they encountered a need to look for information on a course-related subject. The *Diary Client* program was created to try to reduce the amount of time required to diarize each subject searching episode and to increase the likelihood that all episodes would be diarized. Table 4 shows participants' total number of diary entries ranged from a low of 11 to a high of 51 entries made during the study.

ii. Participant-Recorded Online Subject Searches: For the duration of the study, participants were asked to conduct all course-related online subject searching on their loaned laptop in order to use *Camtasia Studio* to record the searches. Participants were given the option to omit recording particular online searches they did not wish the investigator to view and analyze but were also informed that the aim of the study was to capture as complete a record of each participant's course-related online searching as possible. Data on the quantity, frequency, and length of participant-recorded online subject searches are summarized in Table 4. Some very large differences are observed across all participants in, for example, screen recording duration, ranging from .1 minute (6 seconds) to 113 minutes, and in participants' average screen recording durations, ranging from a low of 8 minutes to a high of 38 minutes.

Table 4. Diary Entries and Participant-Recorded Online Subject Searches

	# Diary Entries	# Screen Recordings	# Screen Recording Days*	Total Screen Recordings (min.)	Shortest Screen Recording (min.)	Longest Screen Recording (min.)	Average Screen Recording (min.)
Participant 1	19	26	19	397	1	53	15
Participant 2	49	49	27	109	0.13	18	2
Participant 3	26	36	26	697	1	82	19
Participant 4	51	33	28	177	0.55	22	5
Participant 5	34	27	26	1036	4	113	38
Participant 6	16	12	7	98	0.37	20	8
Participant 7	18	19	17	270	0.73	44	14
Participant 8	29	24	19	295	0.1	37	12
Participant 9	11	8	7	113	9	19	14
AVERAGES	28	26	20	355	2	45	14

* = number of days in which at least one screen recording occurred

Data Analysis

In-depth exploration and analysis of data collected in this multiple case study is currently underway. It is hoped that analyses will reveal informative pictures of what academically successful undergraduate subject searching looks like and will indicate possible factors associated with successful and unsuccessful subject searching.

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