Turning the Page:

Learning about the future of eBooks from Students today

University of Toronto Libraries

Student and Scholar Experience of eBooks

Summary Report

January 25, 2009

Peter H. Jones, Ph.D.
REDESIGN RESEARCH

reDESIGN reSEARCH

Table of Contents

UTL eBooks and the Student Experience

The University of Toronto Libraries (UTL) eBooks student experience study was sponsored by the Library and Information Technology Services. We gratefully acknowledge the funding support received by three publishers: Elsevier, Springer, and Taylor and Francis. The study was conducted by Peter Jones of Redesign Research with Jason Moore of Xinsight, Toronto.

We investigated the current uses of eBooks by students and faculty, their understanding of eBooks and services, and identified trends of adoption as well as new user innovation concepts. The report presents the findings of user research, not a scientific study of behavior. The research was a study of the adoption of eBooks for scholarly activity from the context of user experience and innovation. The current report covers:

- **Who:** University users – Undergraduates, Graduate students, Faculty, and Staff
- **What, How**: eBook content and eBooks services
- **Where, When, Why**: How eBooks are used by students and different disciplines

Structure of the Study and Report

This report integrates findings from the three phases of research:

1) Exploratory survey and contextual interview,
2) User experience research (direct observation of user interaction), and
3) Participatory design research (user innovation).

Research Overview

The report investigates the process of adoption and use of electronic books by students and scholars during a time of significant technology transition. This is typical of published technology-centered user studies, since adopting institutions are faced with more uncertainty during the transition period and often do not sponsor research that follows a successful adoption period. At the time of the study (2008), UTL had initiated a proactive technology project to significantly enhance the eBooks collection, eBooks delivery platform, reading interfaces, and search and discovery engine. Over the course of the year, UTL started its transition to the eBrary platform, and integrated the Endeca search/discovery engine with the Library website. These services were not yet operational at the time of the study. Our findings reflect the UTL platform of 2008, which can be considered state-of-the-art for research libraries currently and over the next 2-4 years.

The current model of eBooks as the scanned content of print text books appears as an inevitable evolution of format. As with journal articles, students also seem to prefer the ubiquitous PDF article format for eBooks. The simplest publishing and development path would appear to be to build upon this platform. We suggest, "this time is different." Many have predicted that scholarly eBooks will follow the successful adoption of eJournals, resulting in widespread use and online reading.

Libraries have generally adopted a content provider strategy with eBooks, emphasizing the need for a critical mass of content in the catalogue to enhance collections and to improve patron access. An assumption is that interfaces and access will improve over time, resulting in satisfactory use and increased adoption. Innovative libraries should challenge these assumptions, to evaluate whether patrons find the content meets their information needs. Here we aim to learn about actual user needs in an attempt to serve the demand for usable eBooks for foreseeable scholarly uses.

> *"A "build it and they will come" approach to many university digitization initiatives, including open content initiatives, has precluded systematic investigations of the actual demand for these resources."* (Harley, 2007)

Perspective on Current Literature

Before starting the study, we reviewed the current literature and found fewer than 30 *applicable* scholarly eBooks research studies published at the time. While the number of library management and collections studies about eBooks grows, few user research studies have been published since.

The notable research studies or commercial user surveys include the following:

> Rowlands, I. and Nicholas, D. (2008). Understanding information behaviour: how do students and faculty find books? *Journal of Academic Librarianship, 34* (1), 3-15.
>
> McKiel, A.W. (2008). *2008 Global Student E-book Survey*. Palo Alto, CA: ebrary.
>
> McKiel, A.W. (2007). *2007 Global Faculty E-book Survey*. Palo Alto, CA: ebrary.
>
> Rowlands, I, Nicholas, D, Jamali, HR, and Huntington, P. (2007). *What do faculty and students really think about e-books?* London: CIBER, University College London.

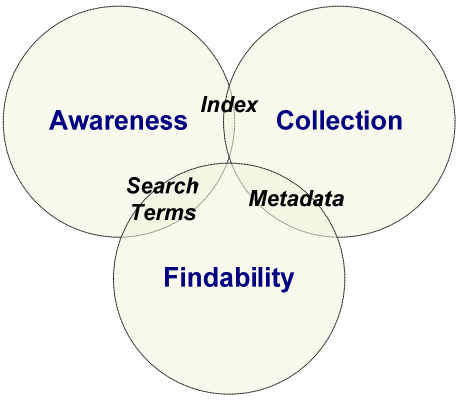
We found insufficient literature to conduct a typical or meaningful review. We drew upon these cited studies within the context of issues presented within the report.

Perspective on Theory of Use

We have adopted a user-oriented, empirical view toward understanding eBook use and adoption. While several theoretical stances may help interpret our findings, we did not pursue the study with a theoretical bias (e.g., McLuhan media ecology, new media, innovation adoption theory). We adopted two well-regarded methodological stances: Dervin's *Sensemaking Methodology* and the "Tampere" orientation toward *information seeking in context*. The research was structured to understand how students and scholars find and employ eBooks today in the context of their academic work. We also studied usability and technology issues that emerged, but these were considered secondary, since these factors are constantly changing in the information ecology.

A simple theory of use arose from the information model demonstrated in the context of eBooks. The figure shows the interaction of three constants in the eBooks ecology. This framework represents and intersects user awareness, findability of content, and collection scope. It explains why users are unable to readily locate eBooks in current systems.

While the model is based on technology factors, the human factor drives it. We represent the user "sensemaking" of eBooks as *Awareness* of an information need and of the content available to meet that need. Users seek with search terms in mind, with expectations of finding relevant and available resources (*Findability*). If search terms are not well-matched by metadata in the *Collection*, their awareness will remain limited, affecting current and future searches. The Collection as indexed (Catalogue) also influences awareness, as users will seek only what they learn is available in the collection.



The convergence of these three factors helps us makes sense of the adoption issues in the current stage of eBooks technology and user understanding. It also helps us focus attention on the problems the literature has yet to disclose or formulate.

The user experience perspective has been significantly under-represented in the eBooks literature, ironically during a period when user experience has become the *sine qua non* for all online interaction. We attempt an authentic disclosure of student and faculty interaction habits, cognitive tasks, and user needs that should permit technology and content providers – publishers and libraries – to enhance the design of services, content, and the future of eBooks as a format or genre.

1. Survey Research

The UTL eResources survey was distributed online to the University of Toronto community from January through April 2008. 301 students and faculty members responded to the survey, of about 1700 invited. Explanation and details were reported in the (Research Phase 1) Survey Report.

Survey Participants

238 Students
6 Researchers / Post-doc
44 Faculty
13 Staff (Librarians)

Survey Sample

Students:

First Year	1 %
Second Year	10 %
Third Year	10 %
Fourth Year	43 %
Master's	27 %
Doctoral	9 %

Most representative disciplines:

Arts and Sciences	55%
Information Studies	15 %
AS and Engineering	7 %
Business / Mgt	5.5 %
Education	4 %

The survey respondents included many more students (80%) than faculty (14%); the distribution of *interview* participants was more weighted toward graduate students and faculty than the survey.

Survey: Use of eResources

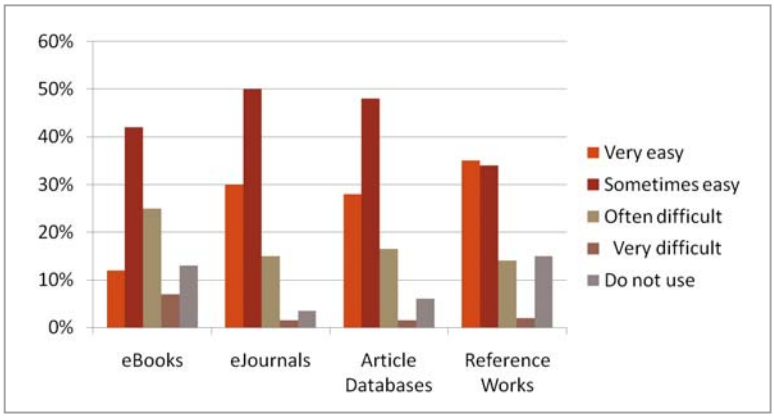
Five electronic resources were rated as "critical" or "very important." Three other resources scored less than 15% as critical (newspapers, digital images, and all "other.") The scores for eBooks matched e-References closely overall. Considering the variability of eBooks, this should be considered

A&I databases	75%	
e-Journals	93%	
eBooks	58%	(25% "Critical")
e-References	58%	(30% Critical)
Subject websites	54%	

However, they rate eBooks *usability* much lower than that of other eResources, as shown in the graph.

Other eResources show scores at around 30% for "very easy," where eBooks show 13.5%. "Sometimes easy" at 42% must be interpreted based on the wide variety of eBooks available that are being rated.

eJournals and Article Databases show much lower difficulty scores, but eBooks show 26% "Often difficult" compared to 15% or less for other resource types. eBooks also scored 7.6% as "very difficult," almost double any others.



Students start their research from the Web

To understand the user's context for eBooks, we must recognize the habitual and cognitive operations of the typical user's search process. According to the survey and observations, most students *usually* start their scholarly research with an open web search (32.4%) or *often* start with a web search (~30%). Google Scholar is used by more sophisticated scholars, not students, usually specifically for locating journal articles.

Resource	Usually start research with	Often use to start	Often use throughout research	Use as supple-mental	Rarely or never use
Web search engines	**32.4%**	29.7%	17.8%		
Wikipedia	14%	23%	15.8%		
Google Scholar	11.5%	16.6%	17.5%		
eBooks (Web)	6%	**15.3%**	**31%**	**25%**	**22.7%**
eBooks (UTL)	6.5%	9.8%	**28.4%**	**30.7%**	24.7%

Wikipedia is a common starting point for students, with participants telling us that, while it may not be citable in a paper, Wikipedia entries are surprisingly accurate and are useful as a general starting point for learning a new topic area. In the print era, encyclopedias and general subject books would have been used for acquiring an initial overview of a topic. The survey shows eBooks are not a common starting point, confirmed by user observations. But eBooks are used "often throughout research," and as supplemental, suggesting that, for many, they are important but are used intermittently. The survey confirmed, in several questions, that roughly one-fourth the respondents have little or no experience with eBooks (as we define them). This proportion should be considered seriously, since the survey has a self-selecting positive bias of actual eResources users. The proportion of eBook awareness from the broader majority of students, who would have considered themselves less qualified to take the survey, would easily be much lower.

2. Contextual User Research

We interviewed 28 participants for 1 hour each in two phases of research, using a semi-structured interview to guide interaction with actual research tasks. While not statistically generalizable, as a qualitative user study 28 subjects is sufficiently robust with respect to user behavior research. We asked students/scholars in the contextual phase (14 participants) to demonstrate online research tasks based on a current need, and asked prompt questions and clarification from an interview guide as they proceeded. In the interactive user research (Phase 2), users started with a contextual search to start with an actual research issue, then were guided to explore and investigate eBooks services in support of their information need. The methodology is described in the Phase 2 report.

Using multiple methods and multiple phases mitigates the risk of positive effect biases inherent in user studies, and maximizes the ability to discover true trends within qualitative data. We aimed to sample broadly, but still found a positive bias because students had to have some eBook experience to be interested in participating, even with incentives. According to Harley (2006), many digital library studies are conducted with an internal bias, which can lead to biased interpretations:

> "The practicalities of conducting user studies present some obstacles, however: high-quality research is resource intensive, and in-house evaluations can result in a "self-fulfilling prophecy" where studies frequently favor relationships and products that already exist. Informal, and often inexpensive, user studies should not be discounted entirely."

Summary of Contextual Research

The first phase of the study followed the eResources user survey with a contextual inquiry phase, conducting interactive interviews with 14 students, staff, and faculty members. We summarized and presented the salient findings (in prior reports). Those we believed warranted early attention were presented as the following 6 *early conclusions*. The subsequent research phase reported – a cycle of in-depth interactive interviews with an additional 14 participants – supports these findings.

1. Users start research from a variety of starting points

- Clear progression toward information seeking relying primarily on simple web searches. But Google was not used exclusively as other studies have found.
- Students have learned from years of Google use that simple searches are often sufficient.
- Simple searches from UTL websites were insufficient to locate eBooks of interest. Users do not understand the scope of a collection, the indexing (the content being "searched in"), or the metadata.
- Users generally discover eBooks with *title* searches, but may not know titles as they begin searching.
- If they believe eBooks to be similar to eJournals in number, scope, or indexing, they will be frustrated.

Unlike previous user studies (CIBER), in the interviews we did not see a significant trend of users starting their research with Google or general web searches. However, our study was self-selecting and sampled from high-performing, perhaps unrepresentative students. Users showed several ways to get to content in any electronic resource, but we found no consistent pattern of use. People showed four different starting points for online research and eBooks, a representative distribution shown below across the two phases of research.

7 Scholars Portal
6 Online Catalogue
5 All eResources
6 Web (Scholar, Google, Wikipedia)

In this phase we note a bias toward using UTL resources, as the general library site was displayed at the start of the session, and we focused the interview on *scholarly* eBooks.

Even given this bias, we see and should expect many different information needs which are not all satisfied by web searching or the UTL online catalogue. But the trend, according to prior (Jones, 2005) and recent (CIBER, 2008) studies, shows a clear progression toward information seeking relying primarily on simple web searches. Consider the implications of the trend of students using *only* Google or web searches, as considered by CIBER. Materials of interest would first be located from web searches, and then tracked down in the library website. We observed this behavior with users conducting book searches with Google and Scholar to locate eBooks from *Google Books*.

Students have learned from years of interaction with Google and the Web that simple web searches are often sufficient for any of their information needs. The vast majority of students and scholars, in this study and in prior studies, formulate searches by entering the simplest terms they believe sufficient. UTL users are generally finding eBooks with title searches on today's website; but since users may not know the titles in a subject area of interest, they will search the Web first to find titles.

We also observed that simple searches from the UTL websites were insufficient for locating eBooks. Users do not understand the scope of a collection, the indexing (or the content being "searched in"), or the metadata matched to terms. If they believe eBooks to be similar to eJournals in number, scope, or indexing, they will be frustrated. In addition, users have no way of easily learning about or understanding the scope of the eBooks collection.

2. Students typically discover *UTL* eBooks via Catalogue searches

- When eBooks show up in search results, it often occurs as a surprise – in most cases (especially at first), the eBook would be seen an alternative to the printed book.

Most students reported finding eBooks when searching for book titles, and notice their availability in the Catalogue as electronic versions. Although students also say they prefer print volumes in most situations, there are compelling reasons for using eBooks, not all obvious to users at first.

eBooks are part of a large and evolving information ecology, and users are understandably *unaware* of the availability of eBooks in the collection. So when eBooks show up in search results, it often occurs as a surprise – in most cases (nearly all, at first), the eBook would be seen an alternative to the printed book, and would be treated accordingly in comparisons.

The undergraduate and many graduate students in the study indicated a strong preference for the printed book, most for similar reasons.

> "I never use eBooks – find it difficult to use them – long and cumbersome."

> "Only times I see eBooks is if a copy is available online. I don't like reading things online – cannot highlight or annotate."

> "I prefer to have a tangible copy in front of me."

3. Few students start by *searching for* eBooks as a format type.

- Student searches in interviews generally started with an expectation to find scholarly *articles*.
- With the exception of searching for electronic versions of *textbooks,* most students did not search for or expect to find eBooks. It was an uncommon *lookup*, but eBooks were found in *exploration*.
- Users were also unable to readily find eBooks in their specific subject areas, if they wanted them directly. Even users who had recently used a specific eBook were unable to find the title again.

Observations revealed that some users who had recently used a specific eBook were unable to find the title again in the UTL site or catalogue.

4. Users currently reveal a wide variety of expectations about eBooks.

User expectations are formed from successive interactions with services and content. With current services, they often experienced disappointing interaction with eBook content (see quotes and data). We must recognize that eBooks are currently a very new media format for most students, and due to the variety of services and types of eBooks, few users have a consistent set of expectations. The variety of formats represents one way eBooks are unlike the diffusion of eJournals.

Most students think of an eBook as a scanned book or series of chapters from a book in PDF format. This may be based on what is available, and what they have found through Google Books.

Most students expect (or hope) that eBooks are provided in single files they can download and refer to later.

Many express disappointment when interacting with eBooks – With formatting, book and page navigation.

> "In a traditional book, you can tell what chapter you're in - not in eBooks like this. PDFs are much better - have ability to scroll down the pages. That's why I don't use U of T for eBooks - I imagine the PDFs in (UTL) are all single page files."

> "I wouldn't mind paying $20-30 (for a valuable text) as an eBook."

5. Users found the profusion of eBook formats and services confusing.

Students often encounter several different services and formats once they explore UTL eBooks. With no mental model of the available content, they do not realize what materials they are overlooking in their searches, and they have no way of learning what the collection is missing.

Most students start a simple research task with a simple Google search, where they may find books located by subject terms. When students use the UTL website, their search may land them in one of several different eBook services. In searching eBooks *only*, usually very few results display (searches matching titles only in 2008.)

Scholars Portal contributes to the confusion with eBook findability. Users expected the service to display *only* eResources – because all the journals are electronic. They expressed some disappointment that the many books listed from the integrated catalogue were not online.

In Scholars Portal searches, users don't know whether they have located an eBook until they review each book's source record. This can be tedious with dozens of hits in the Books tab. (Technically Scholars Portal does not catalog eBooks, but reports, theses, and book serial chapters are displayed, and *these are considered as eBooks by students*).

Based on these observations, it seems understandable that some users will give up on using eBooks. By matching these observations with survey findings, we infer that most students are using eBooks infrequently (and briefly once using). Some quotes add context:

> "I cannot find download or print here. If I really needed it, would copy and paste the section. I normally prefer the print version."

> "If you can find it, (eBooks are) extremely valuable. Very difficult to find an eBook you're looking for! A lot of wrong paths, seems very cyclical."

> "Looked but could not find any titles that matched my needs. Came across some but they were not easy to view or work with."

6. Observations show user impatience with the usability of services.

Within the user interviews, numerous examples are found where users the lack of PDF navigation within MyiLibrary frame, requiring page by page navigation.

Users lose context ("I can't tell what chapter I'm in"), are unable to scroll in the content frame.

> "I'm finding the UI very inconvenient. Some services will scan each page as a separate PDF file."

> "This is aesthetically bad; I have to scroll in single page PDF. Page does not fill the screen."

Research Participants

A total of 28 participated in the interactive user research. The profiles show most students had limited eBooks experience, and graduate students and faculty had more experience as a group.

Academic segment	Major / Disciplines	Experience with eBooks
10 Students **8 4Y Undergraduates and 3 post-graduate**	4 History, Political Science, etc. 2 Social Sciences (Psych, Econ) 1 Physics, 1 Biology 1 Engineering, 1 Art, Literature	8 Minimal experience with eBooks 2 Moderate experience
7 Graduate Students	3 Information Studies 2 Public Health 1 Pharmacy (Pharm. D.), 1 Medicine	2 Minimal experience 4 Moderate 1 Extensive
5 Professors	1 Philosophy, 1 English, 1 Law, 1 Anthropology, 1 Engineering	2 Minimal, 2 Moderate, 1 Extensive
3 Librarians	Gerstein - Science Librarians	Highly skilled. eBooks experience may be based on subject area resources.

We believe a user's *facility* with eBooks corresponds closely to their experience with e-resources in general, and to their scholarly career. We found experienced researchers had better facility (knowledge and skill) with online information resources, as expected. The undergraduates in our sample said they learned to use e-resources in their fourth year, since that is when many of them were directed by faculty to do so for classes. Both survey and interviews support this finding. So we find dramatic differences in online resource expertise among participants sampled in the study. While that discovery was not an objective of the study, the potential correlation with eBook use is important to note. Students also indicated learning to conduct journal literature research *in earnest* as graduate students; but by then, due to the emphasis on peer-reviewed research articles, they were not inclined to read or reference *books* outside of their required book readings. Participants noted their reading load was driven by the development of their research area.

User Contexts for Using eBooks

A major purpose of the research is to identify contexts that drive student use and to understand the motivations that determine their patterns of adoption and regular usage. By contexts, we mean the major activities that motivate people to conduct research and use eResources. The following claims (and their continuing questions) have emerged from the user experience research approach:

- Students show a variety of contexts for using eBooks. But they share no *common* context. (Can UTL provide a common context, or will it be Google?)
- Students and faculty have many compelling reasons to use eBooks. (So why are students not using them more?)
- Users find many ways to locate eBooks and textbooks outside university channels. (What are the implications of this trend should it continue in its current rate?)
- Students are more likely to search for a specific eBook title via web searching than from UTL. (Is this behavior more of a Google habit, or a lack of awareness of UTL services?)
- Faculty are more likely than students to start a search for eBooks in the UTL collection. (Are faculty more effective eResources users or are they just more likely to use UTL?)
- The content and user experience of eBooks differ from eJournals, with more variety and less available content. (What are the priorities and needs to improve the eBooks user experience?)

1. No *common* context shared by users

There is no single overarching "front door" providing university users with a common context for accessing and using eBooks. Other resources may be considered significantly more centered within the university resource ecology. Electronic journals and other eResources are found within a well-defined institutional context – only the university provides (free) access to journals and their access via search interfaces is mediated by the library. However, books and eBooks are also found through *many* channels, and are read and used by a variety of interfaces. Users do not (yet) consider eBooks to be a resource uniquely and significantly satisfied by the institution.

While the University of Toronto is finding and will continue to observe a steady rate of increase of use of their eBooks collection, this may not be due to increased user *awareness*. Students interviewed demonstrated quite limited awareness of content and were unsure of how to find eBooks. Usage is better explained by the matching of better technology (library website searches, federated searches such as Scholars Portal, cross-linking) with the continually increasing volume of content over time.

Students participating in the UTL study were infrequent eBooks users. Most eBook readers were instead actively seeking materials through the Web. Consider that our research participants *self-selected* into this study, and to a great extent represent the early adopters of eResources in the *overall* information ecology. Our participant users should be considered more advanced in their search and research practices than their peers, giving the study a positive bias toward technology and resource use. Therefore, we should discount their experience by a significant weighting to arrive at a more representative interpretation of the state of practice among students and faculty.

For example, one of the most experienced eResources users, a Public Health graduate student (called Brian herein), demonstrated considerably facility with locating exact titles of books in his field through Google Scholar, Google Books, and Textbook Torrents. Brian found free biomedical textbooks through NCBI listings, which were free, if outdated. But he had also found other means of locating current textbooks and common reference books used in his educational program. He noted that finding eBooks within the university systems was not highly productive:

> "I rarely go into eBooks for research issues, not easy to find scholarly eBooks. (Perhaps) if I wanted something specific on a subject."

> "When it comes to web resources, if it doesn't give me what I want in 5-10 minutes, I'm gone. I try to be more patient with U of T, because it's slower. Google Scholar and Google Books are well integrated."

As a telling example, Brian searched a simple term in All eResources (containing "virology"), which returned 1 result. He then searched Google Scholar and found the *Encyclopedia of Virology* on the first page, as well as other Google Book citations. He demonstrated the basis of his assumption.

Log statistics for other studies (CIBER) show an average duration of eBook use at just over 4 minutes. In our direct user research, 4 minutes was the rough length of time necessary to locate and qualify a single eBook, and qualify its relevance by browsing the content. Of course, this also dismissed the book without reading it. Unlike journal articles, users cannot download and read it later.

Brian's experience is similar to other graduate students' in the study. Graduate students use books for course textbooks, in class readings, and as-needed references. Graduate students in social, life, and physical sciences use *journals* predominantly for research, and use few books except for classroom studies and the occasional citation. The *advanced searchers* have learned from online research that books and eBooks are available from multiple channels, and that their diligence to locate a full eBook or a downloadable version is motivated by their academic need. For a citation with a page number, a Google Book search may suffice. Students were aware of Torrent services, and demonstrated their use for textbooks. Given the least effort to satisfy the academic information need, the typical habitual practice would be a simple web search (Google or Scholar) as a starting point, followed by targeted web searches (e.g., PubMed) or UTL Library as next in the chain of alternatives.

2. Primary activities that drive eBook use

We can determine from prior research and the current study that students and faculty have several major activities that drive their use of eBooks. Users demonstrate either necessary or discretionary uses. Necessity is an important distinction for eBooks, because unlike journal articles, many students (especially undergraduates) prefer print and will "accept" an eBook as an alternative format. For *discretionary* uses, such as a book for personal interest or quick evaluation of a book to determine its fit to need, users indicate their interest and often preference for an eBook version.

If the book is considered *necessary* – a classroom text or an assigned book – we found students clearly prefer the printed volume to be used over the lifespan of the course. The contradicting factor here is cost. If a student believes an expensive (close to or over $100) title may be available as an eBook version, they will spend considerable diligence to acquire it.

The user research reveals four patterns of contextual use, and we derived from interviews the related activity patterns for each of these. We go somewhat further and extend the interpretation (in italics) where additional observation warrants it. The table describes the *contradictions* relevant to each activity, where a user might have valid purposes for eBooks, but where the user's current depth of experience is unlikely to lead them to eBooks on the current UTL platforms.

Context for use	Activities and Uses	Contradictions / Circumstances
Class assignments	**Students**: Textbook reading assignments Locating additional book readings **Faculty**: Reviewing available alternative eBooks Preparing online/linked reading lists	Students greatly prefer print to eBooks for intensive reading. But constrained to save money – Reduced costs are a major eBook use driver. Additional chapter readings are perfect eBook applications, but faculty must find, qualify, and use.
Research	**Undergraduates**: Doing less scholarly research, likely to read print books Humanities Grad Students: Locating eBooks in typical online scholarly research Sciences Grads: Occasional use of book references in research reviews	Successful in-depth eBooks searches require more technical search expertise. Humanities *undergrads* less likely to pursue beyond Catalogue searches. Sciences research requires use of journals, so even though researchers are capable of finding, they have less need for eBooks.
Personal interest, Hobbies	Dedicated eBooks users (grad students, faculty) found many eBooks for personal interests. *Inexperienced* eBooks users did not look for or mention these alternatives.	Faculty and grad students that do *not* use eBooks in research may be extensive online readers of books and reports for personal uses.
Pleasure reading	A small subset (2) read fiction and popular books as eBook titles. Faculty were early adopters of Palm, Kindle, portable readers.	Extenuating factor may be learning to read easily online, and the comfort level with various readers.

Table 1. Contexts and User Activities driving eBooks use.

3. The most compelling reasons eBooks are adopted

Students and faculty realize that eBooks are a significant trend, and they are here to stay as a content type. Participants cited numerous reasons why they liked using eBooks, even if they had limited experience with them. These included:

- **Availability**: Unlike a print book, they will not be checked out (with some exceptions)
- **Easier access**: less hassle to obtain
  "Save me going to the library", or in the stacks. "Working late, not on campus... extremely beneficial."
- **Easy storage**, similar to eJournal articles (downloadable, keep on computer)
- **Portable**: lighter, no heavy textbooks, or printouts
- **Environmental reasons**, saving paper, resources (eBooks are green!)
- **Searchable**: Inside the book content, and within a stored personal library
- Desire to read more materials online
- Reduce paper clutter
- Less cost (no need to photocopy) "save some money on photocopying"
- Able to jump to the exact point needed (no need to flip through pages or use index).
  "I just click on something and it takes me to wherever I want." "With paper you have to flip through the pages, or go to the index. This is more easily accessible."
- Can be very readable: with electronic books the font size can be enlarged.
  "Having weakening eyes, I'm interested in being able to control the font."

Even so, many rarely find eBooks because they are not needed or unavailable in their everyday experience. Inexperienced eBooks users (mainly undergraduates) were likely to find scholarly eBooks only by finding them in Catalogue searches. When materials are located opportunistically, the first impression counts. New users may be turned off by eBooks with a complicated user interface (what most saw until quite recently). As we heard from some newer users, they may assume that *all* eBooks are complicated, and may avoid them from thereon.

> "I'm familiar with scanned books, classics. I would use eBooks more if the format were better, more readable. But if the book were useful, I would use it no matter what the format was."

Experienced eBook users also tended to express personal motivations that led to more patience with searching and finding eBooks in the various services available. One motive was a general desire (voiced by several faculty and graduate students) to learn to use all types of online resources in a disciplined way, to carry and manage less paper, and to read effectively online. Some saw this as a more efficient research practice, others an environmental responsibility (less paper), and others as well seeing this as the "way of the future." Therefore, some users expressed their interest in finding an eBook title for various reasons:

> "If I'm lucky, I get an eBook. Otherwise it's just a regular paper book."

> "I hope there are eBooks so I don't have to go to stacks."

4. Students locate eBooks outside university channels

The different eResources managed by an institution's collection provide users with their most obvious context, that of the available, visible, findable content. Consider the diagram in Figure 1 showing access to resources between undergraduates and graduate students.

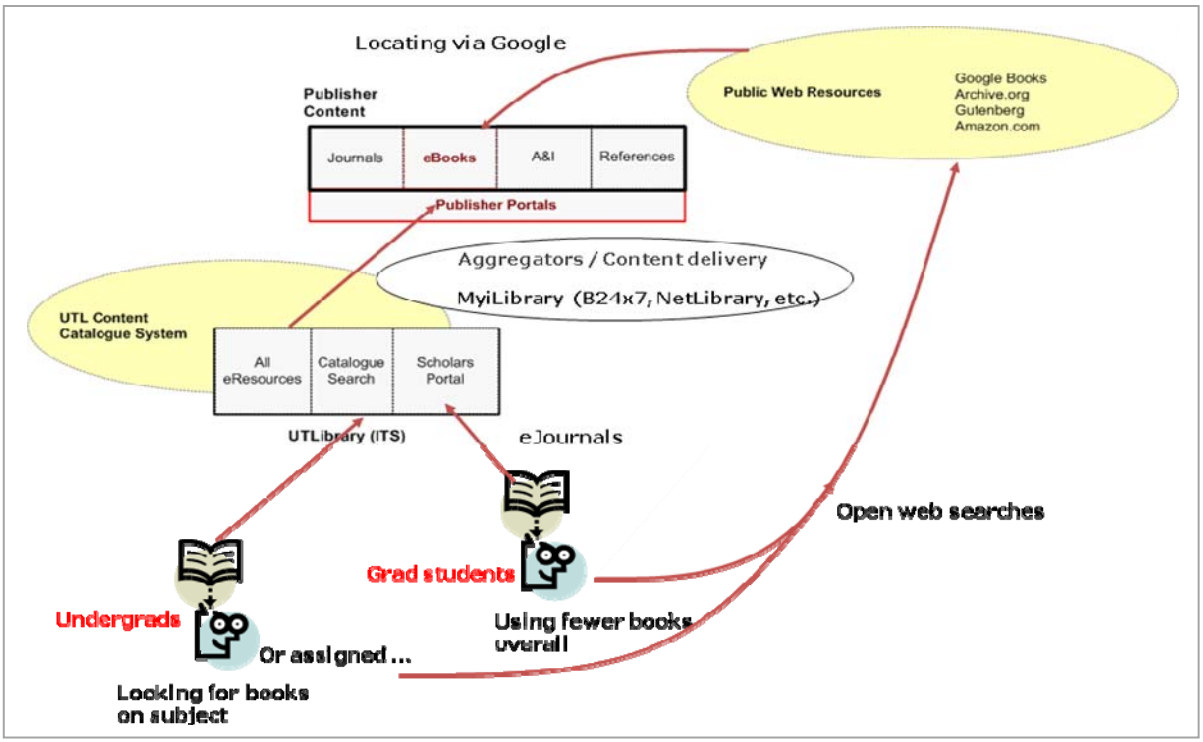


Figure 1. Student access paths to eBooks at UTL.

Undergraduate students, from 1-3Y, are locating and using print books and readings for assignments and class requirements. We have observed significantly less experience with eBooks among 1-3Y undergraduates, a finding reflected in interviews, as well as supported by the proportion of undergraduates taking the survey or responding to interview invitations. Certainly their stated preference for print is unrelated to Web awareness – many younger students have been online half their lives or more. Should we unpack this preference we may learn that the preference relates to the perception of eBooks, not from experience with them.

Undergraduates use scholarly book content for:

- Readings from required textbooks
- Assigned chapter or brief article readings
- Independent study reading
- Discretionary reading

Given heavy courseloads and clear guidance from most syllabi and reading lists, they are less likely (until 4Y) to explore beyond assignments and reading lists for subject comprehension. And students said that they first found eBooks when assigned by a professor, often listed or linked on a syllabus.

The most significant eBook driver for undergraduates might be the eBook version of a required textbook, with its compelling cost saving. This motive is the source of the Torrent websites for scanned textbook exchange. But we also heard from students that were given the alternative to buy and use an eBook or standard print version for a sophomore Molecular Biology class, that only one student was known to have bought the eBook version. Even though the print version was large and heavy, these undergraduate students (2 casually interviewed) were unwilling to risk their grade on the unknown interaction style for learning the subject from an eBook.

Understanding the User/Student Experience

The user experience of eBooks is highly dependent on the resources an individual finds useful, usable, or pertinent to their research. If a material is useful, its usability can be overlooked somewhat. If utility is marginal, poorer usability will limit further exploration. User experience is also related to one's prior experiences and the accessibility of other content in their environment.

How eBooks fit Student Information Practices

Scholarly work entails repeated, habitual information practices such as qualifying research claims or tracking citations for precedent research. These are information practices, habitual patterns that rely on information for supporting work activities and decision-making. We call this user "sensemaking," which requires us to answer, "**why is the user taking *this* action?"**

An activity context helps us understand and even project trends based on understanding the user's reality. A strong information science or IT perspective may fall into thinking that better technology may improve a resource's adoption, when there may be social factors and activity constraints that would suggest slow uptake.

We show a simple set of activity scenarios based on our user experience findings that illustrate the user observations of eBooks use. The following table shows 5 information tasks that show up in the eBooks context, each relating to a different overall activity. We identify "triggers" for these tasks that show us when and why the tasks are initiated in the user's information need.

Activity Scenarios

We found five information tasks evident in our data that drive users to eBooks. these are common scenarios for students, professors, or researchers, the actual tasks are conducted in highly varying ways by different users, depending on factors such as experience and expertise.

eBooks Information Task	Is part of Activity	Is *Triggered by* (Information need)
1. Background research	**Learning new subject** – part of coursework or seminar project	Assignment or selection of a topic
2. Exhaustive search	**Establishing research base** for a problem. Research paper (for class), Thesis research, or scholarly/lab research	Need to identify scope and standing of knowledge in a research subject
3. Exploratory search, browsing	**Meaningful scanning** of the materials or information in a relatively known topic area	Need to continue learning within a known topic or to update knowledge
4. Directed search: Citation, Author, Title	**Direct locating of a specific title** or series by author, usually part of another activity	Need to locate and refer to a specific title or author
5. Discovery	**Multiple** - User is finding book titles and notices eBook version may be available	Need to identify books or resources available in a subject for any purpose

Table 3. Information Tasks - Related Activities.

1. Background Research task

The undergraduates typically started sessions with a research topic based on a class assignment. Some topics were more pertinent to (known) eBook content than others, but the student user would not be sufficiently aware of the collection to know whether eBooks were worth searching in as a resource type. Background research for a topic might be a perfect case where eBooks would provide value, if they could be located within a broad search and compared with other articles and content titles. But eBooks are not referenced or abstracted well enough to help the "background searcher."

Political science post-graduate: Looking for background on history of Eritrea. Starts with Wikipedia ("good at distilling basic information"). Finds a book title from Wikipedia, and pastes the title into the UTL catalogue to search ("I prefer seeing thing in print"). He also Googles the author to check out their perspective ("in our 3rd and 4th year, we were forced to look at authors and publishers for bias").

Finding nothing related in the Catalogue, prompted him to try Scholars Portal ("I never heard of it in 5 years here. Really great in principle.") Most titles were easily ignored, as they were obviously too general or too specialized. But candidate titles had to be reviewed one by one to determine their value. He eventually found an African political reports service, not quite an eBook, but as a PDF, his preferred format for online materials.

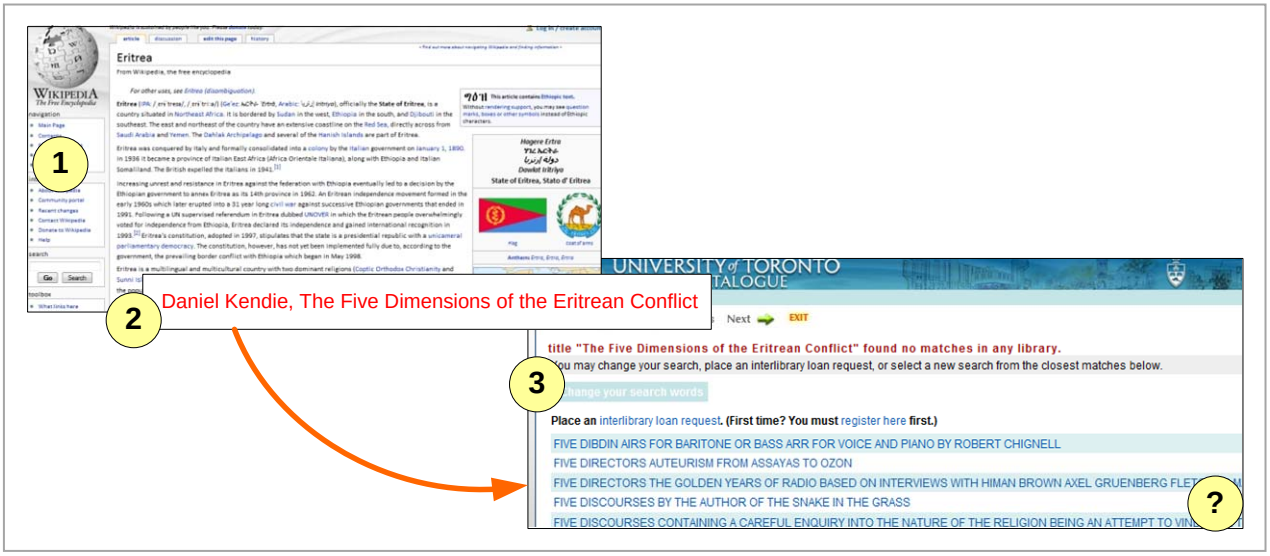


Figure 2. User linking between services for Background Research.

2. Exhaustive Search task

While users did not actually conduct exhaustive searches during the course of an interactive interview, the need for exhaustive searching and locating all relevant articles (and sometimes books) was common. For some users, this activity might immediately follow the background research activity, as a continuation of initial research. For others, notably graduate students and faculty in sciences, the exhaustive search is conducted before pursuing scholarly work or writing papers.

In most sciences, only journals are searched. Books are rarely included even in an exhaustive search, as they are not considered primary references. Future eBooks services could be indexed to be easily included in such services. If users were aware of the types of books (in e-form) *considered as primary,* and if citations could show their referential value to the problem being searched, they would be used.

Books are primary research materials in humanities and some social sciences, so would always be included in an exhaustive search task in arts, languages, and other humanities.

Pharmacy doctoral student: He had used some eBooks as an undergraduate at Alberta, but does not have the necessity to refer to books frequently in his doctoral program. He preferred print (personally does not like reading from a screen).

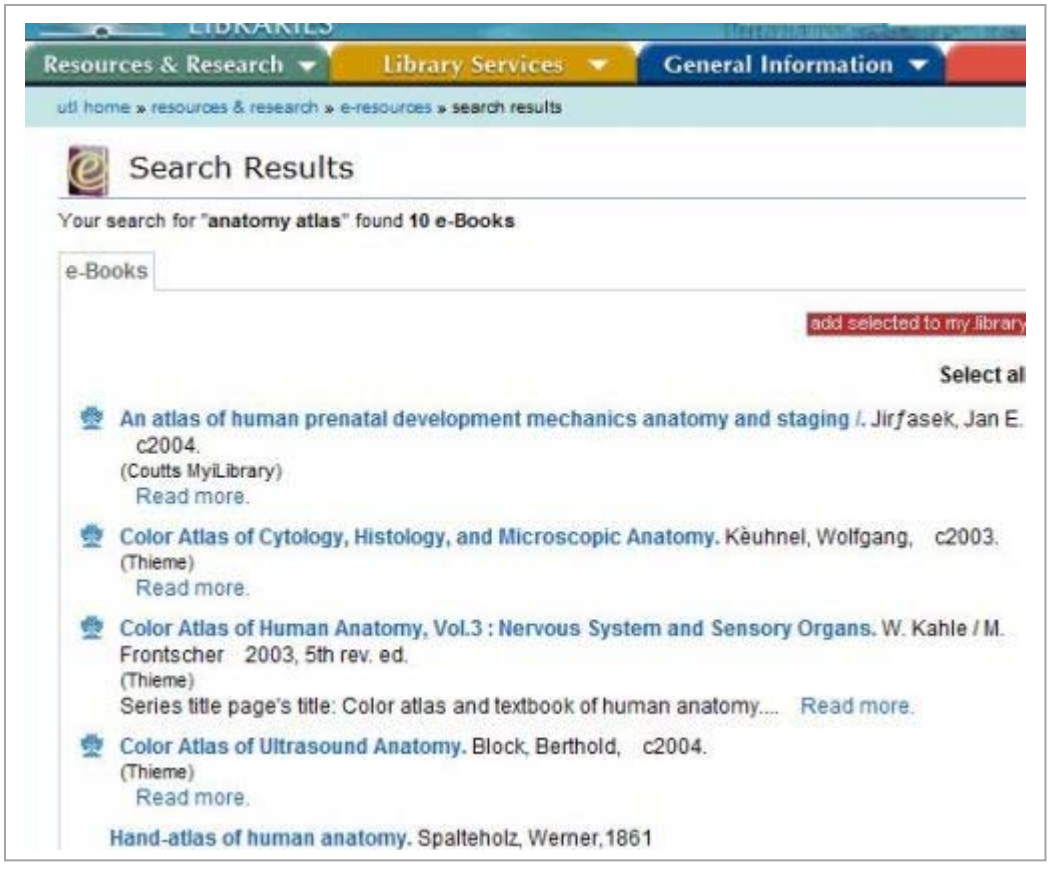
> "I don't use books as much in grad school."

> "Personally I haven't looked for eBooks. In terms of research, it could be easier using eBooks for references, mostly for background research."

As part of an ongoing search strategy: All eResources search: "glutamate receptors." He finds only *theses*, no eBooks in title search. Searches "brain," (an irrationally broad term, just to find material). Finds ScienceDirect chapters on brain mapping; but no relevant matches to his original search. He wondered aloud whether "glutamate" would have been found if directly searched in ScienceDirect.

3. Exploratory Search and Browsing Tasks

Users often browse for other materials once underway with another task. We might call this *opportunistic scanning*, a strategy of learning and iteratively evaluating the available topics and titles in an area of interest. Meaningful opportunistic scanning can be conducted as its own activity, to update current knowledge, as part of a background search, or as a search to find *available* titles. Since eBooks are novel to many users, they expect to find well-known titles (such as Netter's Atlas) available in the eBooks collection, or will explore eBooks in their consideration of similar alternatives. From our observations, students should not be expected to consider such atlases "e-References" – a book format resource would be considered as an eBook.



\

Figure 3. User Exploration for Type of eBook.

Medical student: She used Google searches and Wikipedia, "which is surprisingly accurate and reliable. e.g. composition of IV fluids, Ringers Lactate, popped up in Wikipedia." She explored for other medical reference resources available in All eResources, searching "anatomy atlas," but was only able to locate older scanned texts, nothing like a current (Netter's) atlas.

> "An eBook would be particularly useful. The computer version is better, you don't want to carry a whole book atlas with you."

4. Directed Search tasks: Citation, Author, Title

Within interviews, it was common for users to identify a specific title to search for as an eBook based on our prompt. Most students would start with a web search for a given book title, if the book were unknown to them, in order to qualify it. *Google Books was used in several situations for this, and was also thought adequate for the purpose of citing a quote within the book (a common task).*

Literature professor: Is prompted to find Scholars Portal, and searches for the title "Things Fall Apart." Finds over 900 results, and is unable to determine order. He adds author name "Achebe" and finds a smaller number. Rather than the book, he finds an article in the journal *Explicator* (which was useful as an *accidental discovery*). He needs text from an eBook to copy and paste into a composite document. To locate the eBook, he searches Google for "Golden Dog Kirby." "I wouldn't go to the library website." Google Books' first result was the book.

Medical student: Explored Wikipedia for a directed search for "IV fluids" in the Harrisons Internal Medicine eBook, and found results in Harrison's unsatisfactory, but an exact answer in Wikipedia

Figure 4. Directed Search – Comparison of Wikipedia and Primary eBook.

5. Serendipitous Discovery

The fifth task is shown as an opportunistic way of learning about eBooks within a Catalogue book search. Most users had first discovered eBooks were available by tracing a book title from a UTL Catalogue search and seeing the title was provided online. This discovery was considered a direct replacement for the print title. While users are delighted to realize eBooks are available for some titles, most students still prefer to *read* a printed book, if the goal is to locate and read an entire book or several chapters. For a review or scanning quotes, however, discovering the eBook is a timesaver.

Political science 4th year student: Although she reads plenty of books, she has minimal experience with eBooks. She looks for books first in a catalogue search, and then for articles in online journals.

> "The only times I see eBooks is if a copy is available online. I don't like reading things online – cannot highlight or annotate."

Summary of Information Practices

These cases reveal the interaction patterns users naturally follow for certain information tasks. There are several examples for each of these patterns. We can explain the relationship among all these tasks by the proposition that eBooks (in *any* information ecology) are not yet readily *available* (scope of collections), *findable* (by metadata in their chosen search), or *relevant when found* (by match to their need based on general terms entered). Although users do not have sufficient experience searching for eBooks yet to understand these relationships, they do have other resources ready to hand via the Internet. When one information seeking strategy ends with insufficiently relevant content or usability, users turn to Google. Unfortunately, this may reinforce a user's mental model of scholarly eBooks as a lagging resource type, an expectation that could prevent subsequent returns for some users.

The vignettes also should make it apparent there are significant cognitive and resource design hurdles for users adopting eBooks into their scholarly information practices. Consider that all these interactions describe finding and navigating *to content*, and not the usability or interaction within the book, which show other usability issues.

Search, and Finding eBooks

We summarize the user experience findings on user interaction with eBooks services and content. We thoroughly examined five categories of user behavior with content in the full report, including:

1. Search Starting Points
2. Initial Sensemaking of eBooks
3. Formulating Searches for eBooks
4. Navigating Search Results
5. Acquisition of the eBook

For the Summary Report, we present a brief discussion of user behavior relevant to eBooks.

Search Starting Points

As noted in prior research (CIBER 2007, 2008), the eResources survey, and observations (described in the prior chapters), users have habitual starting points for information tasks supporting their scholarly activity. In general orders of frequency / popularity, student starting points for searching resources were indicated in interviews as follows:

- Web search / Google
- Wikipedia
- Google Scholar / PubMed
- UTL All eResources search
- Library Catalogue

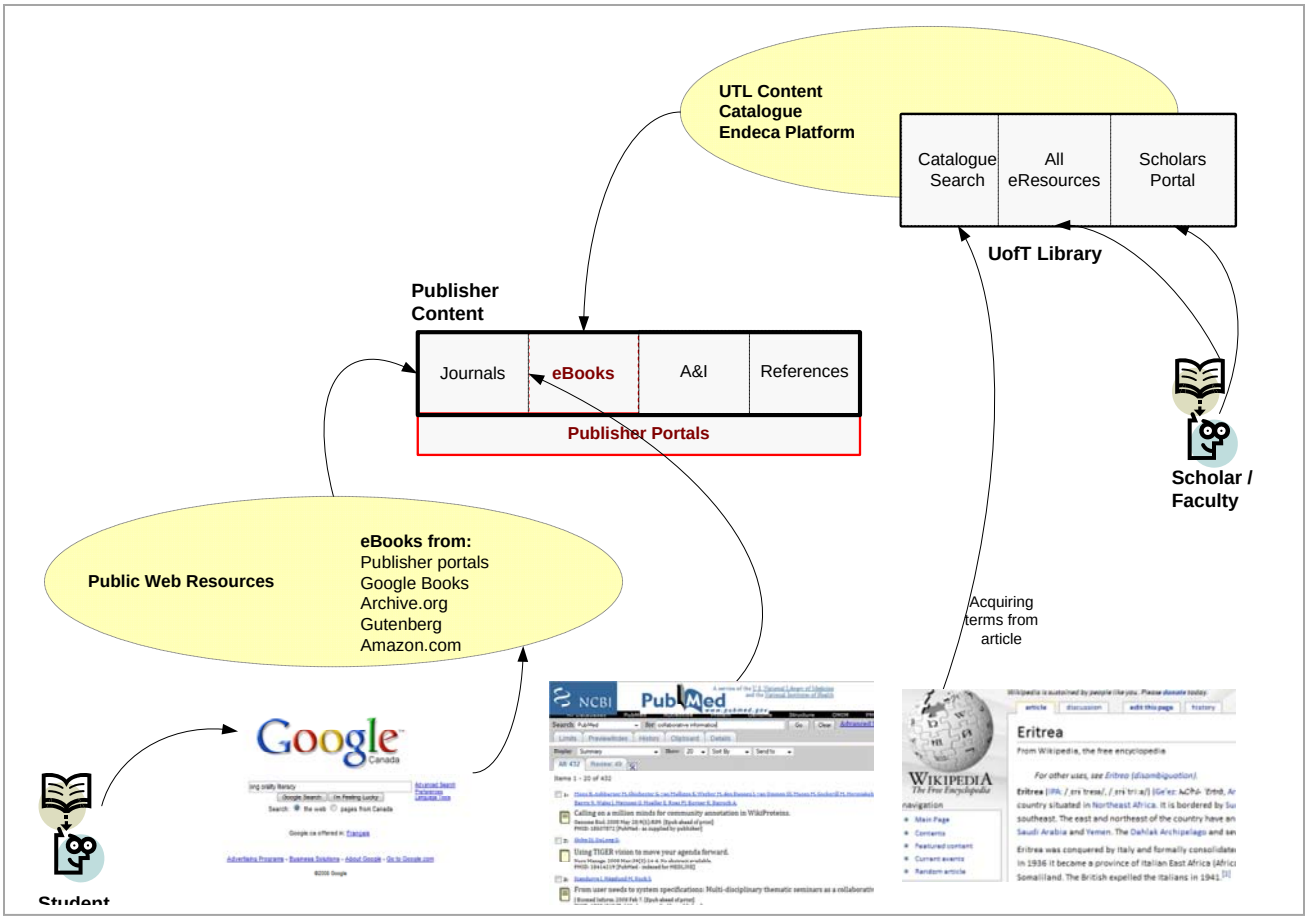


Figure 5. Primary Search Paths to eBooks.

The student start points and paths are illustrated in Figure 5. Students often start a research inquiry with web searches or public web services (Wikipedia). Scholarly references to articles or eBooks will be resolved through their university access if logged in or in IP range. Many of these references will launch the publisher portal independently from UTL websites. While students report searching the UTL Catalogue for *books* (but *not* eBooks), they start from the web for most other searches for materials in their investigation of a research issue or an assignment.

Scholars - faculty and graduate students – were more likely to start with a search for authoritative materials, typically journal articles. Two web search services were commonly used, Google Scholar and PubMed (for most life sciences, medical, and health researchers) to locate links to articles or abstracts with links to full text. Other scholarly research often starts with UTL: A database search, All eResources, or Scholars Portal.

Compared to the (old) search and MyiLibrary services, users said they better understood the display of an eBook result from a Google / Google Books search. Students demonstrated immediate facility with Google Books and understood the limitations on content. They recognize that common books in their topic are very likely to be retrieved, and are often acceptable even with content limitations. We observed several users seeking a specific title using Google/Google Books, and all were successful finding a Google Books version. For many purposes, such as this quote suggest, the freely available eBook version, with its limited content, suffices:

> A Public Health graduate student was searching for books on epidemiology of cancer in the workplace. He first tried (upon prompting) Scholars Portal. There were 77 books with *epidemiology* in the title. He gave up on these results and located a relevant book quickly with Google Scholar.

The opportunity for finding and becoming aware of eBooks in the UTL collection is limited if students stay within a web context. *Perceived* successful interaction with Web eBooks becomes reinforcing, reducing the need to run separate searches at UTL for other eBooks.

This is quite possible, given the fairly seamless pass-through to publisher materials under OpenURL and institutional IP linking. These searches may find abstracts and journal articles, which are well-indexed by standard metadata and abstracting. However, simple web searches do not locate eBooks within library collections, leaving a significant and growing corpus unavailable to the unreflective web searcher.

Initial Sensemaking of eBooks

A scenario from a 4Y political science student illustrates how a positive experience locating eBooks can change the impression of the resource. She was conducting current, ongoing research on a senior paper on Kosovo independence. Students in the study rarely searched specifically for eBooks, and she had never done so, citing their usability drawback as she had perceived them:

"*Never – I find it difficult to use them – they are long and cumbersome*," a statement supported by consensus experience, and then "*eBooks are rare in my field*" an unsupported and untested assertion.

Following her stated research needs, she started with an abstracts database search (International Political Science Abstracts), and formulated a simple search for her topic: *Kosovo independence*:

> "Honestly, don't know why they think students can use this - We aren't trained, haven't been taught and/or searching, or other types of searches."
>
> "I prefer a Web page to read from. But for studying, need a PDF format. Easier to cite from, page numbers, et cetera. I print, always."

To attempt to locate eBooks, she switched to All eResources in the UTL site, and tried both *Containing* and *Starting With* searches. Her final try yielded two eBooks. One of these "Understanding the War in Kosovo," she then skimmed in MyiLibrary and apparently changed her previous opinion about the usability and format.

> "Not so bad… I don't like seeing blank pages. But other eBooks are a lot more restricted."

While this student did not follow the book scenario to its logical extent, just this one experience revised her perception of the availability and types of eBooks in her field. However, her lack of experience with *all* eBooks is also suggested by her finding the MyiLibrary user experience better than expected, when experienced eBooks users generally found it a cumbersome experience. Her change of perception from one interaction indicates that a significantly better interaction design might yield many more converts once they overcome biases and learn a new interaction style.

Interaction with eBook Content

We observed users accessing over 20 different eBooks services or interfaces. The diversity of interfaces allows us to compare and analyze different approaches to the eBook interface and highlight usability problems as well as best practices. We discuss user behavior in 5 interaction patterns that characterize use of eBooks.

1. User Sensemaking of eBook Content
2. Reliance on the Known Interface
3. Paging Interaction
4. Wayfinding in the eBook
5. Reading Text

User Sensemaking of eBook Content

There are significant differences between how people read printed books (browsing or cover-to-cover) and eBooks (interactive browsing, skimming, searching), with different sensemaking styles.

Skimming the Content

We observed two predominate cognitive styles of interaction with content as users *first browse* any given eBook: *Skimming or searching*. We expect some users perform both styles within an information task, but in recorded sessions most users demonstrated one or the other, based on whether the task was exploratory or more directed.

Skimming refers to browsing through content to quickly scan and assess materials from a context of recognition. It is a sensemaking strategy - if users discover or recognize information objects relevant to their intended interests, they continue with *acquisition*.

Participants were able to process large amounts of content with ease. Users skimmed:

- **Search results** (to identify interesting resources or to determine that they need to reformulate their search query).
- **Chapter listings / Table of contents** (to determine if the book is relevant or interesting to their research question, or to jump to a particular chapter of the book).
- **Book content** (to skim the material quickly to verify whether the content was applicable)

Most users tended to skim in the research sessions. If a user has no particular keyword in mind, they generally will skim and evaluate the book before committing to reading sections in more detail. Users start skimming in the table of contents initial focus of skimming, and were seen scanning large amounts of text quickly. Users wanted to skim the entire TOC as a scrolling page. Unfortunately, few eBooks were designed to present long scrolling pages.

The process of skimming is closely related to evaluating the quality of a resource. It is a rapid assessment of a collection of related materials. A graduate student (information studies) said:

> "If it's something I know quite a bit about, I would look for specific things. If it's an area that's relatively new to me, and this is, I would be browsing first of all to find what other people write about, just looking at the titles, and based on the titles choosing to skim some, or read in depth."

Searching in Content

A *search* is performed when the user is focused on finding a specific quote, term or author. Users who already understood the materials in a domain and were looking to add to their learning would focus on the terms of interest only to qualify an eBook for further reading or referencing.

> "There's also a search function. say, I want to search for a specific word that's not visible in the index I can just search for it." (Student)

> Viewing the table of contents: "This is good... all the chapters. So you can go through and pick what you are interested in reading." (Professor)

While eBrary offers better support for *skimming*, its search behavior was confusing to users. The search form is accessed by clicking a tab as in other interfaces, but the search results appear in the book pane. As a result, running a search *closes the current book*, and viewing search results opens the book again. Users also noted some confusion between the web browser's search bar and the eBrary search, which was located near the (now standard) Google search bar.

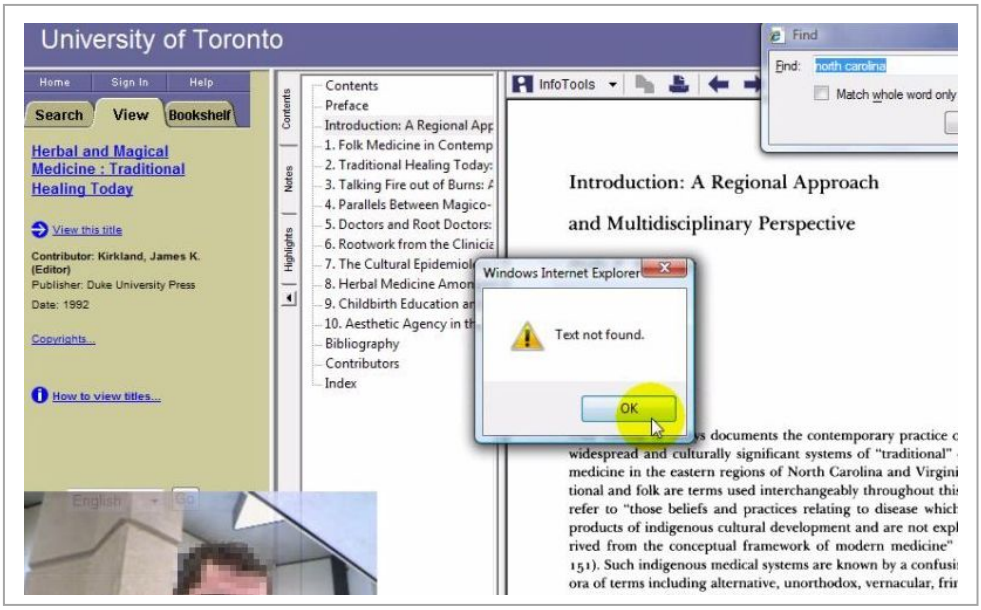


Figure 6. Graduate student searches as if in HTML/text file.

> "If it was similar to a PDF… It doesn't have to be a PDF, but what I like to do is look for a keyword…"

A graduate student treated the eBrary document as a searchable text, and typed Control-F to call up the browser's Find function. He received no results even though 'North Carolina' appears on that page in what appears to be a PDF style document.

There were two ways of accessing search in eBrary. The most noticeable being the form available in the left pane search tab. However, this search also disappointed users when they found they were searching across ALL eBooks and not just the current book content.

Users often have a single, simple goal in mind, and they rely on prior experience to guide them in a new interface. Yet every eBook service requires learning different document interaction features, which is problematic, as users must make sense of an infrequently used interface *and* unknown content. Students interacting within online materials on the web typically find text documents in PDF or HTML formats, and they expect to maintain this expectation within eBooks. A novel user interface may not be a problem per se, but when the continuity of their pursuit for information is interrupted, it becomes a real time-waster. When users encounter multiple user interfaces, which may or may not comply with prior standards, the situation creates an even more complex navigation experience.

Reliance on Standard Interfaces and Habits

As all users had prior experience with eJournals and downloadable PDFs, the PDF format and Adobe Reader interface was recognized as the most common eBook interface. The PDF standard could be considered the reference point that eBooks in general should match or exceed. It allows for both keyword searching, and skimming, but mostly importantly, it is well-known to users and is extremely mature in the adoption curve.

Well over half of the interview participants expressed a strong preference for using a PDF version of an eBook or chapters. The primary reasons supporting the preference included its familiarity and portability, as well as ease of printing. Numerous comments suggest that students rely on the PDF and other familiar standards (Google searching, browser-based interfaces, scrolling pages, simple search boxes in eBooks).

> "I have preference for hard copy – Page number continuity is important as others are referring to it too. The PDF display is familiar. The eBook is not."

> "If the entire eBook was PDF … and better if eBook sections could be in PDF format."

Paging Interaction

Most of the eBook interfaces observed adopt the convention from the print book of displaying content as numbered pages. Discrete paging on an electronic screen made sense to all users, and is an essential requirement for citations and references.

> "If you make an eBook look closer to a real book that makes me feel more comfortable." (Medical student)

However some eBook interfaces have focused on the concept of paging to an extreme extent. The page of text has become so central to the interface, that it becomes awkward and slow for users to change pages. The two main problems we observed were that users were unable to locate the controls for changing pages, and even once they knew of their location, they generally felt that the strictness of viewing one page at a time was too granular, and awkward to use.

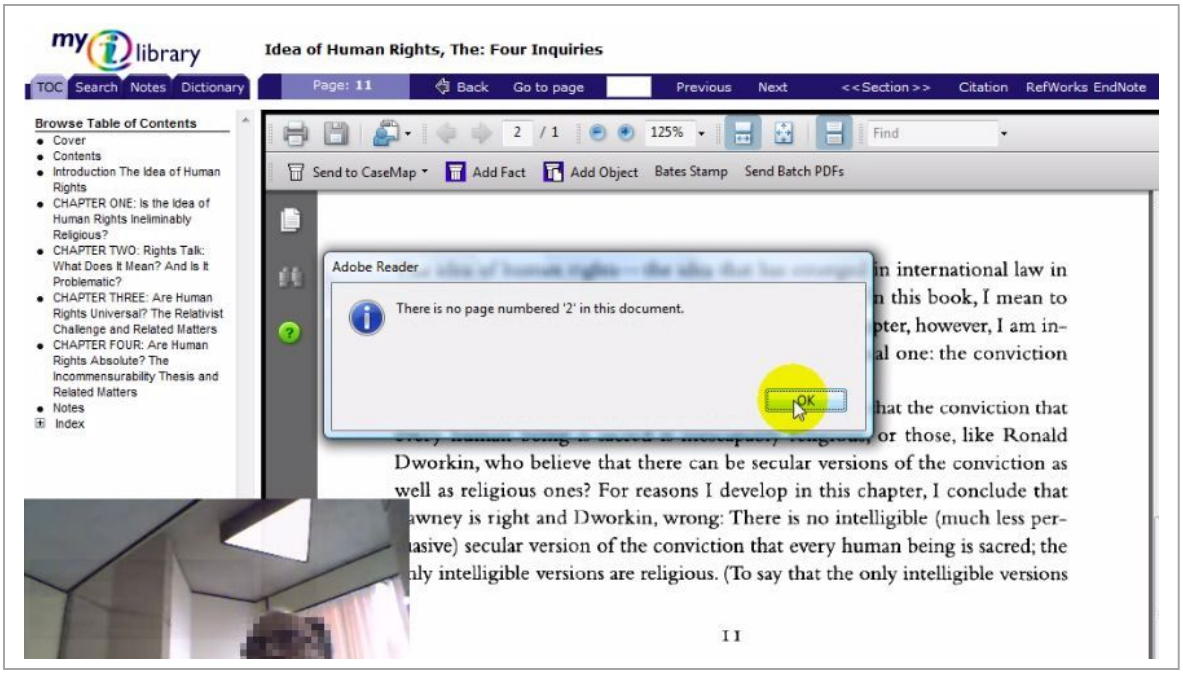


Figure 7. Professor attempts to use PDF interface in eBook.

For example, in MyiLibrary users were unable to locate the "Previous" and "Next" links (in the blue nav bar above the Adobe nav bar), and some concluded they were only able to read the first page of each chapter. These were the only pages that could be accessed with MyiLibrary's TOC feature. Users expressed the need for more natural, flexible paging consistent with the print experience.

> "That's one disadvantage with eBooks, you can only look at one page at a time and it's hard to flip back and forth between the two."

Users were confused when viewing a scanned PDF-based eBook (e.g., in MyiLibrary, NetLibrary, Thieme) to see the eBook wrapper displayed in the familiar Adobe toolbar, but the interface did not allow interaction consistent with a PDF document. People could not use the Adobe search or navigation, which for many was the immediate selection based on their prior experience.

A better example of paging can be seen in the eBrary interface. It still relies on displaying a page of content at a time, but it loads pages automatically as users scroll.

> "Continuous would be better. Just roll page after page." (Professor)

Again the eBook experience is being compared to the experience of viewing a plain PDF document. The PDF reader interface is not perfect, but it is the standard upon which eBook interfaces will be compared. Simply adopting PDF technology is insufficient to inherit the familiarity and comfort of the PDF interface. In the cases we observed, merely adopting the PDF interface within the wrapper of another service actually caused more confusion than benefit.

The difficulty with actually reading continuous content in eBooks can be seen in several users who commented that they would only use eBooks as a quick reference. They didn't feel the interface was appropriate to reading an entire book.

> "In general, reading off the screen is quite painful, unrewarding. When it comes down to studying, I need to highlight, make notes in margins."

> "For quick reference, prefer eBooks. For specific example in book, or definition. If reading less than dozen pages, eBook preferable. If it was hard to read, I would get the print copy."

The desire to enlarge the onscreen text area is understandable, when we consider that the online eBook reader interface (Figure 8) incorporates multiple viewers and navigation bars.

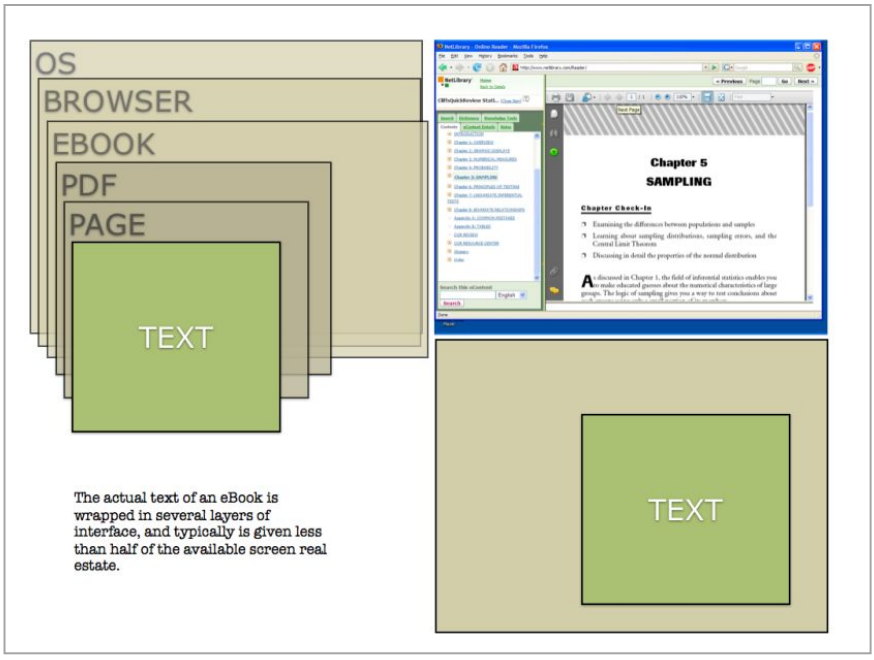


Figure 8. Multiply embedded display in one eBook window.

Differences in eBook and eResources Use by Discipline

The third (innovation) research phase was designed to meet the last two objectives of the study:

- What features and interaction tools do users like, and what do we find is ignored? Why? What are the recommendations and opportunities for resource/user interface design?
- What design alternatives to the current eBooks environment support the findings?

We further developed understanding of eBook uses and behaviors by having users engage in mini-design workshops that require their articulation of preference and need. Participants were able to clearly describe the features and interactions that fit their scholarly needs, as well as identify current systemic interactions with eBooks and services that inhibited their information needs.

Session Summary

The participatory design sessions organized participants by similar disciplines to explore and discuss their research practices in the context of eBooks. (Methodology described in full report).

Disciplinary Groups	Participants
4 groups identified based on prior research	17 total participants Lead users (experience + insight into improvement) All with > 2 yrs experience with UTL eBooks services, & Google Books All with >2 yrs eJournals experience
5 Humanities	2 Philosophy - Doctoral students 1 Art / History - Doctoral student 1 Philosophy professor
4 Engineering / Technology	1 MIE/EE Doctoral students 2 4th Year: EE and Systems Design 1 FIS (Visualization) + CS Grad student
5 Social Sciences / Business	2 FIS Graduate students 2 Rotman MBA students 1 4Y undergraduate
4 Life Sciences	2 Master's Public Health students 1 Genetics 1 Molecular Biology

Innovation Research Workshops

Readers should recognize the purpose of the innovation research was not to produce scientifically valid evidence of user behavior by discipline. This method of participatory design research was specifically designed to investigate the emerging opportunities for eBook innovation by analyzing the study, research, and critical reading preferences of "lead users" from 4 distinct disciplinary groups. The sampling was not intended to be generalized to the disciplinary group, it was meant to let us study representative activity in depth (known as purposive sampling in qualitative research). The lead user methodology enables us to draw analyses from behaviors that represent distinct differences found between scholars pursuing research typical of those disciplines.

The design workshop followed the same process for each disciplinary group. Over the course of a two-hour period, one hour was spent on interacting with a current research information task and reviewing current eBooks, and the second hour was devoted to group analysis and ideation to improve eBook services. Between the two 50 minute-sessions, participants interacted with and evaluated the Endeca system (at McMaster University Library) and the eBrary service (which held the summer 2008 collection of Duke University, Springer, and other publishers' eBooks).

Participant Responses to Endeca and eBrary

We summarize user responses drawn from interaction with the Endeca interface on McMaster's Library site, and the eBrary platform containing current Springer, Kluwer, and other publishers' titles.

Endeca Faceted Browse

- Seems much easier than UTL website on first use (none had trouble with it)
- Faster to learn and use —no tabs, UI also displays quickly, page transitions fast
- search model readily understood (tabs for Basic – Advanced – Browse modes)
- "Sorted" results were thought very helpful – Format types were noticeable.
- Easy but not obvious - Some users did not notice facets until pointed out
- Good for students—who need help searching "If not an expert, it's very helpful."
- Links to multiple online resources "all over the place" – helpful for discovery
- Some were not sure about the accuracy of categories – but thought it helpful to expose them
- For serious researchers—need to check each hit. (Would not rely on the categories)
- Can jump immediately to online materials (or traditional catalogue as well)

eBrary Platform

Real pluses compared to MyiLibrary:

- Engaging, looks simple and friendly
- Search within book and highlighting of original search terms is excellent
- Users like the amount of information displayed for search results
- Continuous scrolling is much better, improvement. (But not all eBooks support this mode)
- Performance much better than in paging model
- Easier to copy and paste from page to Word files
- Typography generally good in the eBooks, easy to scan (especially handhelds)

Several usability issues were identified:

- Graduate students want to save refs and book citation easily, across Ref Manager formats (BibTeX, Folder with PDFs, Word file ref lists). From eBook, looks like manual copy/ paste.
- eBook sidebars occupy too much default space – not all users will resize, it is not obvious
- The search feature was hidden in the menus (it was in a pulldown menu in a tab)
- No search results page. No indication of total number of search results
- Bibliographic information not clearly displayed for saving citation. Scholars also want to know ISBN (or see a link to buy the book).
- Book page numbers unclear – are these the nav numbers or eBook page?
- Print feature in eBrary displays by default - but if user does not see *Setup*, they think they cannot print.
- Footnotes are not linked
- Unable to open a new window
- Unable to zoom and control image display

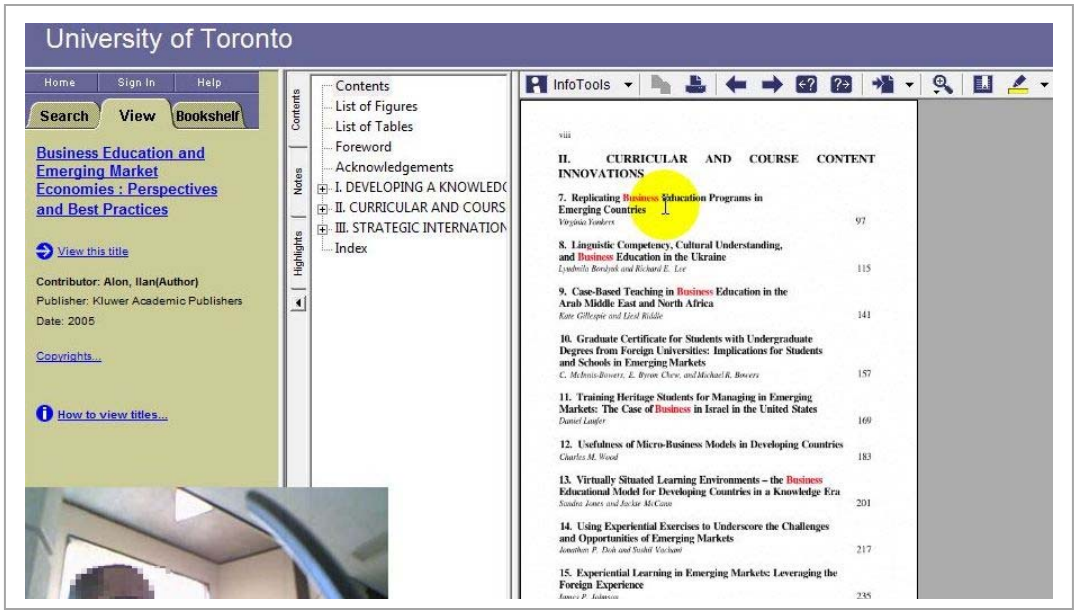


Figure 9. eBrary content displayed in test system.

Student Experience of Using Scholarly eBooks

- **Users see the value in searching for book content by searching in full text**, **in Google Books** or even Amazon. Experienced eBook users knew to search Google Books first, qualify a book of interest, and then use that as a reference to locate it in UTL.
- The UTL cannot be a one-stop research shop, but it can help students by creating research environments that support disciplinary differences. Humanities (and Engineering) researchers would benefit from having Google Books integrated with UTL eBooks searches. Sciences researchers would benefit from seeing other non-journal resources linked when referenced. All disciplines might benefit from some integration of "social awareness" across services and materials via local linking and bookmarking.
- Students using eLearning services would like to transparently link from Blackboard to UTL resources, and run Google searches in UTL from these other UofT services.
- **Integrate with other resources in learning experience**: eBooks have no association with other classroom or UTL resources from lecture notes, syllabi, and student materials.
- Student suggested integrating all their classroom materials & references as metadata for other students to refer to in their classes. Build an ecology of materials, references, links, and eBooks among all classes in a discipline or across selected disciplines.
- This innovation idea extended to the possibility of creating classroom-based social networks, class wikis, and student feedback (rating) systems.
- Many students have handhelds, but are not using these for eBooks or journal articles. Prefer to print and read articles on paper, markup and annotate.
- An engineering grad student reads (paper printouts) while mobile (on the train), but does not read online. Would like to synch local and online, eBook as online only does not help across timeframe of study. Need local copy of at least sections or chapters; user would print and keep a copy.

3. Interaction and Innovation by Disciplinary Group

1. Humanities – Behaviors and Concepts

The following descriptions are illustrative of differences in research behavior by disciplinary group. For the purposes of identifying possible systematic variations, differences *between* groups are more important than coherent validity within a group. Because of small sample sizes used in a qualitative exploratory phase of research, we were unable to sample widely enough to represent the significant variety among the many fields in Humanities. However, we found consistency within the other disciplines (sciences, technology, social sciences) consistent with prior research, some of which is highly illustrative of user behaviors. In all cases, we use pseudonyms to identify user statements.

Finding Materials for Research: Information Foraging vs. Targeting

The humanities participants demonstrated widely different information seeking styles. Stefano, a philosophy doctoral student, is a classical **information forager**. When searching for materials in earnest, he often **searches multiple sites and catalogues at once**, including Google Books. He will often enter the same or similar terms in 3-4 catalogues, e.g. "Levine Theology."

He says he is not "in general looking for *eBooks*" unless he cannot locate the book locally. As a forager, he notices *information scent*. He likes the book cover feature in the UTL catalogue (results list) as it helps him locate the book in the stacks. He uses online services such as WorldCat to evaluate and qualify books for later dedicated reading.

Susan (a pseudonym), an Arts History graduate student, reveals a more targeted information practice. She has a precise subject area (e.g., 19th century art history books) and **searches materials directly in the UTL library,** including All eResources (journals and eBooks) and the Catalogue. Upon finding a title close to matching her information needs, she will often click through the UTL subject classification links to browse to other related titles.

Roger, a well-published Philosophy professor, was the sole dedicated eBooks user/reader in the study. Proving an exception to "scholars do not start by looking for eBooks," **Roger often starts with searches to locate eBooks in UTL directly.** He searched in All eResources for title "New Hume Debate." He is an avid eBook reader, and keeps about 50 of them on a Palm reader. He also recently purchased a Vista-based palmtop PC that he intended to try for eBook reading as well.

Search Engine Uses: Stefano is interested in complete searches. He doesn't trust an interface (like Endeca) to help him narrow things down. He wants to view each hit himself. To ensure he is not missing anything, he opens several sites in separate tabs and he compares his searches across each site, typically including Google Books, UTL, University of California, Harvard, Duke, and WorldCat.

> "In general, I open 3 tabs, just to make sure I'm not missing anything."

He knows that **Google Books is the only service that searches in the content of the book**, and he finds it can provide him with books that he would never find otherwise. When he finds a book of interest in one of the other sites, he cut and pastes the title (or author if the title is too generic) into the UTL catalog search. If the book is available as an eBook he would access it.

Susan also uses Google Books, showing rapid successive entry of terms to locate relevant titles. She follows the search terms highlighted in a selected book, then may return to Google and enter other terms based on what she has found. She also sets up multiple browser tabs, for targeted searches: Just Google Books and the UTL Catalogue, copying titles from Google and entering in UTL.

> "Usually when searching, I test by entering a term I see on the book page. It would be fantastic if I could link Google Books to UofT."

Navigating the Book: Reading, Searching, and Browsing Styles

Stefano collects numerous eBooks and sections of text on several USB flash drives for his continuing studies. However, he *rarely reads online*, and prefers to read from paper or an original book if possible. He will browse an eBook to determine whether information is of value to further research. When navigating an eBook to locate content of interest, he shows how he follows an argument throughout the text from start to finish – and at times will read the entire thread of discourse online in one sitting (including footnotes and references). He needs to read footnotes and endnotes in their entirety, but needs flexibility with their display.

Susan, on the other hand, demonstrated a targeted navigation style in the book as well as in searching. When locating a relevant title, she scans the table of contents to assess the content. After reviewing one TOC example, and finding it insufficient, she jumped to the Index, and found the entries were linked, which she appreciated.

> "Which I find that the majority of the eBooks that I use at the U of T website don't have their indexes hyperlinked, which I find incredibly annoying – because of the way high-level researchers use books, you don't ever read it cover to cover, you're using it and flipping through and trying to find the information that you need."

However, the page navigation required her to click several page icons to navigate the index entries. She also likes to search for targeted concepts and references (e.g. "romance, medieval, etc."). She finds it valuable to scan (browse) the image plates to quickly assess the scope of discussion and to associate the art within the historical time periods of her interest.

When switching to Google Books to continue looking for relevant materials, searching for the same research topics, she immediately found a recognized title in the first page of search results.

> "So this is really good – there's an author that I recognize, it has my search terms, it's nice that it is longer, I would probably read to see if it is actually useful."

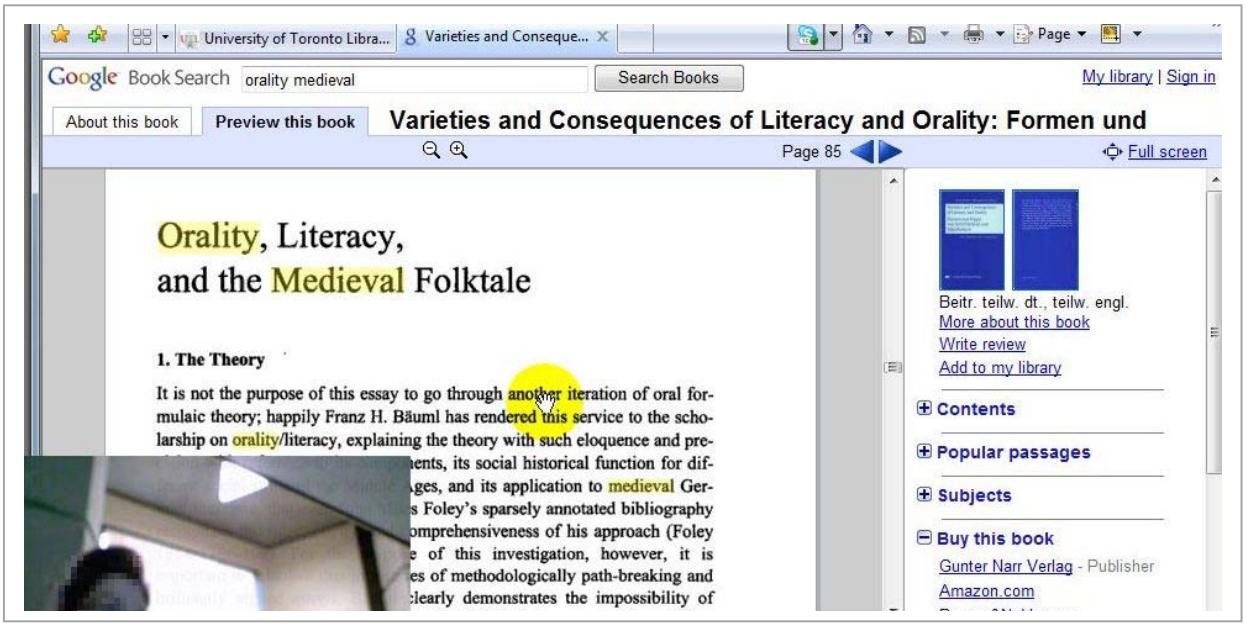


Figure 10. Finding search terms in Google Books.

Roger tends to scan the TOC as well to locate a chapter of interest. He prefers the footnotes to *follow the text at the time of reading*. He would *scroll* the chapter, but is forced by the book to click the next page instead. He wanted the ability to expand the text size in eBooks ("An advantage of onscreen reading is to control the size.") However, he is forced to adjust to a horizontal scrollbar upon enlarging the text, which is frustrating. ("I'd just like to read it.")

His chief frustration with eBooks is finding texts that have been formatted to require clicking an icon or *Next Page* to navigate pages. The inability to print in these books is a significant drawback:

> "To print page by page with Acrobat, is impossible – you have to read slowly, page by page."

All noted the necessity of *symmetrical linking* of footnotes, endnotes, and references within the eBook. This requires that every link to a page or note has a means of linking back to the source link, to maintain the starting page context.

eBooks Fragments: All Humanities scholars felt that for *research* "you don't ever read it from cover to cover." This was also seen in their style of reading eBooks, as they start with the contents looking for sections of interest. This was also reflected in their habit of copying and pasting text to Word files, to keep local copies of significant text. While these scholars were not literature researchers, an emeritus literature professor (in Phase 2 interview) showed that he would read fiction from eReaders, but not from computer / laptop displays.

Browsing the Bookshelf: Stefano spoke of how he finds useful books by going to the stacks to look for a particular book, and then browsing around the shelves to discover books by proximity.

Susan was the first participant to show use of *subject navigation by classification topics*. She displayed lists of book titles by historical period by selecting the links for the library classifications.

Frustration with Catalogue: Susan noted that pre-1900 journals are catalogued under different names or subject categories change. Stefano commented that many of his inter-library loans have been cancelled when a book he requested was found to be at UTL, but that did not appear in the Catalogue.

Humanities Design Concepts

The following design concepts were envisioned, sketched, and discussed by the Humanities participants. These concepts are responses to their experiences with the eBooks evaluation phase preceding the design concept exercise, either to address the shortcomings of current eBooks and services and their usability or to suggest features for an "ideal eBook" for their research.

Integrate Google Book searching with UTL

Humanities participants suggested the value of **searching UTL resources from a Google search**, as well as the converse. If the **UTL Catalogue linked every title to a Google Books page for the title**, users would be able to quickly determine whether the book was worth their trip to the stacks. They may also find just enough information for a key citation or reference, which may have required significant time to do otherwise.

Enhance and Integrate Library Searching

Humanities users were more interested than other disciplines in **seeing available eBooks in all searches**. The sciences users tended to screen everything out *except* journal articles, but Humanities graduate students wanted to see books primarily (Humanities including Art History, Philosophy, and we could assume languages, history, cultural studies, literature as well). While these users liked the Endeca search, some remained unsure whether they were retrieving *all books* in a subject search. Figure 11 shows a user concept displaying *book metadata* in an Endeca search.

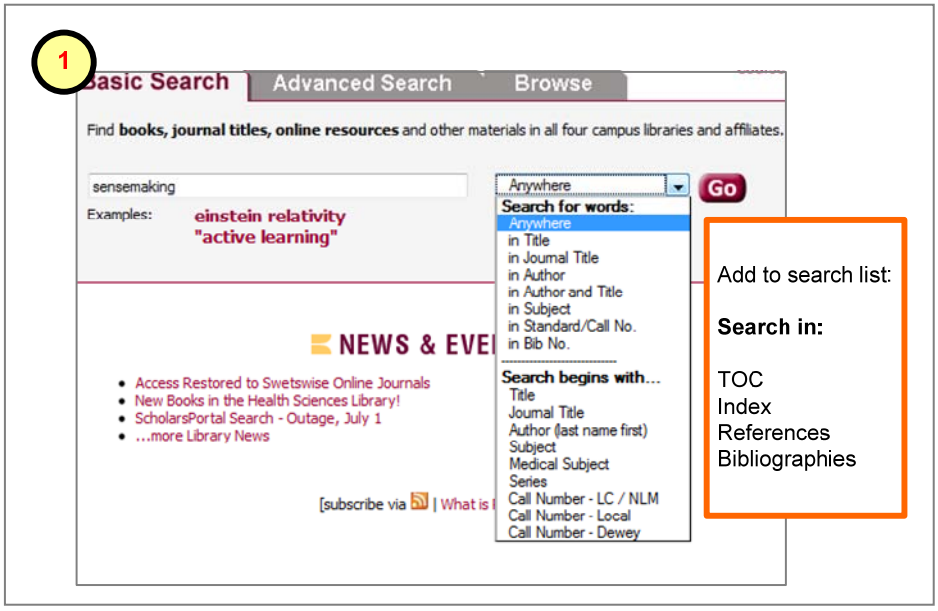


Figure 11. Add book metadata to search forms.

They believed search results could be enhanced to preview more of the known interaction around a book. The search results should be "similar to Google Scholar / Books" in its display of linked titles and brief 2-line abstract, including:

- Keywords, TOC, Citations to book
- Display of authors and snippets of discussion about the book
- Links to Articles, Reviews, other books citing the book

Improve eBook Record / Page

Humanities users thought the eBook page display could be improved by:

- Showing Subject / Books in stacks, to allow users to "virtually view the shelf" and navigate to previous / next books in the stacks, and view ahead 3-5 books.
- Bibliographic information could be greatly enriched beyond the Google page, including a full citation and bibliographic entry, the TOC and links to Index and References.
- Could provide links to text in HTML or PDF formats.
- Show / link to citations that appear in text or at end of chapters.

2. Engineering Behaviors and Concepts

Workshop Observations

Engineering users demonstrated information practices similar to one another, characterized by a problem-solving orientation. Engineering and technology graduate students are often more engaged in *project* research than in literature research. While literature is important, the latest practical information regarding technologies is often much more critical to a research project than published research, which is often considered outdated. Similarly, fourth year undergraduates were also more interested in current technology, career assistance, and technical reports than journal articles or eBooks. Typical eBook searches described by participants in engineering disciplines included technical manuals, programming resources or specifications, and industry reports.

Information Practices

Most engineering users started a research information task by searching Google for specific keywords, and iterated searches and materials from the search results. All four participants were extremely literate in Web services and research tools. Although most started searches from Google or Scholar, these users were also well-versed in publishers' sites like IEEExplore, Online citation managers like Zotero and Cite-U-Like, Social networking, and UTL's my. Library.

Google for search / Library for access to content

Google is a starting point for search, especially book content - but only because it returns effective results. While not perfect, it gives users a reliable starting point. As engineers learn more about a topic, they identify specific authors, titles, journals, keywords. Once they have found a target article or title, they may find the UTL website and copy/paste the title into a search.

Engineering users still use the library (and feel it is necessary) in order to access the titles. The library search tools were not thought helpful in their research or information seeking:

> "It is generally only helpful when you know exactly what you are looking for."

The Library can add significant value to publisher content. One participant was designing Web 2.0 social technologies, and wished the library adopted some of these collaborative features. He felt tagging would be helpful, to present a view of books from the users' perspective (as a *folksonomy*), presenting information such as:

- Rating different resources
- Finding books that were rated highly by people he knows
- Knowing what courses used a text
- How often a book was accessed.

This type of data might be found useful and relevant to users in many other disciplines. Most of this metadata is provided from the university and the library users themselves, not publishers.

Limited Awareness of Resources: By using Google to find resources, students have no way of knowing that they can access these materials through the Library. The students are not likely to pay for materials on the web, and we found they generally keep searching for a more accessible (free) resource. The engineering participants believed that the library search could be better (they clearly appreciated the Endeca interface on the McMaster Library site). To increase awareness, they suggested a library search link could be placed on other University student sites and services.

Searching Start Point

Google was *always* used: "We search knowing there are limitations, but it always provides answers." The graduate students conducted serious research queries using Google Scholar. One searched books directly using Google Books, (although not recently, he used to more before graduate school). The others tended to discover books while doing Google searches.

For locating eBooks, engineering users were reluctant to use the UTL site, especially as a starting point. In our interviews, some started with Google and then found materials linked back via UTL.

Engineering Design Concepts

Integrated UTL and web Search

Engineering students' design proposals were both far-reaching and feasible. The most compelling projection was that of integrating all preferred resources into a single Google search. Figure 12 shows the 2-step process of searching from a local instantiation of Google that indexes the Library.

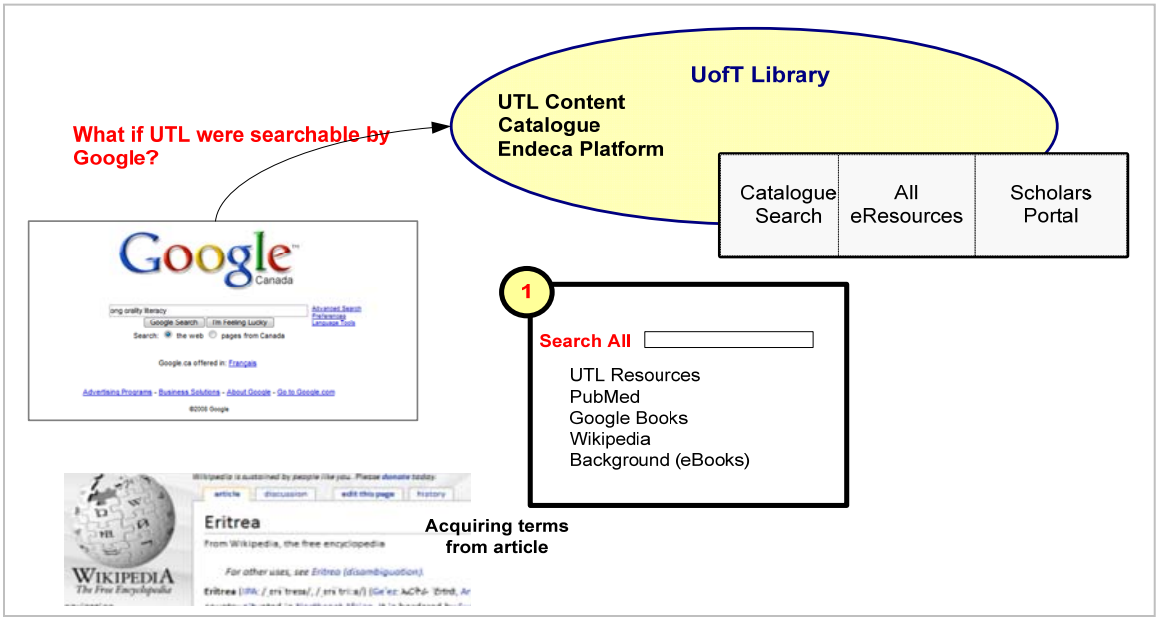
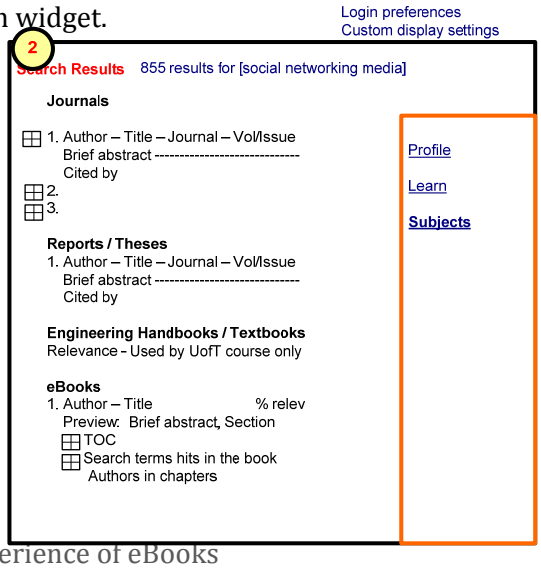


Figure 12. Integrating UTL and Web resources into search.

Step 1 shows the proposal of a *single search* interface allow users to select either one or more than one resource for searching using a local Google appliance. UTL resources would be set as the default option. E very student might set up such a local search widget.

Step 2 shows search results, highly modified, not standard Google. Results sorted by type of material, with relevance or date order, depending on content type. Results should enable users to launch selected documents directly from the search results (in new tabs).

eBooks were considered a special type, allowing the display of an overview or abstract (as with an article), the TOC, and other information. This was thought to help users find good eBooks by showing their value in advance of browsing the content.



3. Life Sciences – Behaviors and Concepts

Sciences scholars used Journals almost exclusively. They all viewed books with skepticism of their value. Books were considered "*out-of-date as soon as they were published*" and would only be useful as a reference for a basic undergraduate level topic. Journals were the main resource they used, and their reflection on books and eBooks tended to be filtered through their experiences with using electronic journals.

Use of Books / eBooks for *practical* needs. As with the engineering students, life sciences graduate students recognized their use of traditional book materials would be limited to references and lookups for practical situations, and not scholarly needs.

Disappointing initial experience with UTL eBooks. One user searched for a Photoshop reference in Library eResources. Finding several eBooks, he found the book "tremendously frustrating" to read. In MyiLibrary, the pages were too short in display (no scrolling). They judged the clicking and time involved (for each click and page display) needed to find any content and noted the scrolling and zooming required to read online. Aside from performance, none of these user interface problems were considered major, but they resulted in the user abandoning the eBook after 5 minutes. He simply Googled for specific Photoshop questions instead (which he would have done if not in a workshop.)

PDFs unsuitable for online reading: Two users felt strongly that the PDF format was best for printing, not for reading online. It has the wrong *shape* (aspect ratio), and requires zooming to view clearly. Both agreed that HTML was superior for online reading as it filled the screen, was easier to copy and paste, hyperlinking was generally present, and the pages were easily scrolled. They preferred scrolling through a long HTML "page" as opposed to a short "print" PDF page.

4. Social Sciences - Behaviors and Concepts

Workshop Observations

Separate workshops were held with business and information studies (IS) graduate students. The IS students demonstrated typical sciences research practice, with continuous use of and referral to journal articles and infrequent use of books in research or coursework assignments.

The MBA students showed a diverse profile of practices. Both were interdisciplinary program students and were pursuing projects as opposed to traditional science-based research. They were perfect "lead users," but atypical social sciences or business users.

MBA Student Interaction

Always start with Google. The MBA students start nearly every research session with Google "to see what pops up, what's most reliable." For one example, the MBA student was looking for public data on small-medium size Canadian businesses, and was judging the authority of the source by evaluating the URL and domain name (then author) for each hit in Google.

His goal was to acquire PDF articles on the subject: "I would skim over them now and read later." For a specific answer "I'm not interested in the PDF" but the answer itself.

In-depth research requires more than Google

Neither MBA student had used the UTL site recently, although one had conducted literature reviews with UTL "earlier in the research." One had need for information on small-medium businesses and Googled "University Toronto library" to find the site. The reaction was "too many search boxes here, a generation raised on Google is used to just an open search box." Once looking at the available resources, they were surprised "I didn't know such materials were available at UTL."

One MBA student used both Google (for commercial information) and *Scholar*. He demonstrated a practical search to locate an answer and background on the size of the Canadian market for Internet advertising. After not finding anything helpful using Google, he resorted to Scholar to search more in-depth articles. Most of the papers on the subject were from European or other international journals. He admitted to avoiding Google Books that might be found in the Scholar search:

> "Most of the books that Google shows me are painful to look at."

eBook search not a typical practice

He found and evaluated several eBooks, from *Books 24x7* and *NetLibrary*. Both made the same types of observations recounted by other participants (page navigation, page sizing, critique of searching). The main problem, not noticed at first, was that the book was a 1999 edition. In technology disciplines, books are often ignored because they are thought outdated, even if much newer. (Results lists of eBooks should display a prominent publication date, and sortable by *recency.*

Both business students thought it helpful to find URLs within a book, since they would be well-qualified sites. *"I value URLs more from a book than from Google."*

One of the MBA students challenged the necessity of maintaining an outdated book, suggesting that publishers have authors continually update the eBook version, a kind of *network eBook*.

Traditional Social Sciences – Less Google, More UTL

The IS students diverged in practices – the undergraduate used Google Scholar to start research, but was familiar with UTL and used the Catalogue. She was more familiar with eBooks than other undergraduates, and was able to locate relevant titles to her queries in the Catalogue.

She found the TOC of a NetLibrary book confounding, ("kind of lost with all these plus signs…") and noted the lack of an index. When searching terms in the eBook, she was unable to tell the order of results and was unable to scroll through pages displaying search hits. When finding the References in this scholarly eBook, her reaction was "it would be amazing if you could link directly from these." She copied and pasted a title into Google Scholar, finding the report available as a single PDF file.

> "If they managed to get 350 pages into a single scrollable file, they could do this with an eBook."

The IS graduate students suggested a typical pattern was to start with the UTL site, using the Scholars Portal resource as a research starting point (both learned the resource in graduate school). For eBooks, one complaint was that they could only search *titles* on UTL. The IS/Philosophy graduate student indicated her practices included the use of more eBooks over time:

> "I am using them more, but not because they are easier to find. Finding the ones I want has never been very difficult, because I usually look for well-known titles. I will likely change that practice now and look for lesser known or recently published eBooks, especially the latter."

Yet even the IS graduate students noted their preference for print books, when reading books:

> "I prefer hard copy, I like to have it in my hands. If I have to find something from home, the eBook is convenient."

> "There are times I would use books, and eBooks, but not that often."

Social Sciences Design Concepts

Social sciences users did not find searching and navigating in current eBook services any easier than the other disciplines. Social sciences students were infrequent eBook users, so were not aware of all the resources and ways of accessing them. In the workshops, they suggested improving the interaction problems they perceived in current resources.

Search and Locating eBooks

- The social sciences emphasis on journals will not normally discover eBooks, unless an exact title is needed for a reference.
- In which case, users resort to using Google Books when a title is known and required.
- IS users were trained in eResources, so were aware of the UTL eBooks collection. Even so, even the best searchers expressed difficulty in finding a specific desired eBook. (See Awareness, Findability, Collection model on page 2).
- MBA needs included a diverse mix of business research and reports and news. Current resources require multiple searches that include Web searching, UTL reports and journals, and any credible materials that may answer questions or aid problem solving. The Endeca search model should be especially helpful for supporting the needs of diverse information sources for interdisciplinary problems.

eBook Navigation

- Recommendations for improving eBook navigation differ between disciplines. Social sciences users suggested more interaction-level improvements to navigating in eBooks.
- Show a prominent Search box. All tools for searching within eBooks was found cumbersome – even in eBrary, users were unable to determine which search interface to use. The context menu (right click menu) was not found an obvious location for searching within an eBook.
- The eBrary Info Tool was appreciated, and the features were thought useful. Yet users saw the tool as inefficient, requiring too many clicks.
- One suggestion was to include other search tools within the context menu to include Google Books and other eBooks. This would allow users to select words of interest in book content and jump to a new search.
- Users wanted a more familiar interface for eBook navigation. For example, DVD style Play-FF buttons for page control, and a Zoom control for enlarging page display.
- Page and page number navigation was a problem in eBook services. Paging must be more web-like (back buttons to previous page viewed, not the prior page in the book).

eBook Content Features

- Any eBook should allow immediate access to PDF file versions of the book.
- Social sciences users wanted a universal citation or simple reference linking for an eBook.
- Allow searching for references across eBooks
- *Cite this Book* feature needed. Allow user to highlight and copy cite – also send to Refworks and EndNote
- Easier annotation. Show and print summary page of all highlights and annotations a user made.

Conclusions and Summary

Our report takes a strong user activity perspective, advancing our understanding of the student's experience as they represented in interviews and observations. The research combines qualitative, empirical, and interpretive methods to describe user interaction patterns using eBooks. The unique contribution of this study is to provide well-substantiated insights about user behavior in the context of authentic scholarly needs, by careful sample selection and study design, backed up by supporting details and qualified interpretations about observed behaviors. This report is not intended to present analysis or documentation of Library collections, online services and content, or even the usability of UTL resources in general. There are other limitations as well, including the inability to recruit participants from some disciplines considered particularly important to understanding eBooks (English, literature, languages), and the unavailability of the UTL discovery engine and eBooks platform during the course of the user research. While we believe resolving these limitations would enhance the study, they would not obviate any of the current findings.

eBooks exist today within a very large, complex, interconnected information environment. We have attempted to analyze user behavior within that environment related specifically to the finding and use of eBooks. We do not generalize these findings to the use of eJournals or other content types. A significant body of digital library research already exists to support other resource types.

During the course of this study over the first months of 2008, the public reports from a major study conducted by CIBER at University College London became available. Many of our findings are independently consistent with CIBER, and some conclusions may be aligned.

According to the 2007 CIBER study on eBook use at UCL, eBooks are showing broad diffusion among the university community (44% of respondents indicate some use of UCL eBooks). However, their recommendations for increasing utilization would not necessarily work in the Google-centric world of students that they also describe in their 2008 follow-up report (Rowlands, et al, 2008):

> *"The significance of this for research libraries is threefold:*
>
> - They need to make their sites more highly visible in cyberspace by opening them up to search engines.
> - They should abandon any hope of being a one-stop shop.
> - They should accept that much content will seldom or never be used, other than perhaps a place from which to bounce.
>
> *Students usually prefer the global searching of Google to more sophisticated but more time-consuming searching provided by the library, where students must make separate searches of the online catalog and every database of potential interest, after first identifying which databases might be relevant. In addition, not all searches of library catalogues or databases yield full-text materials, and NetGen students want not just speedy answers, but full gratification of their information requests on the spot."*

While our behavioral findings are similar to CIBER, our interpretations and conclusions differ. Libraries in the future can be one-stop shops, if they integrate appropriately with web services such as Google and the publisher portals. When metadata is enhanced and publishers produce deeply granular content, eBooks may be used in innovative ways, not just "a place from which to bounce."

The CIBER study was more future-oriented, and they posited audacious claims about the future role of university libraries, based on a trajectory of current web use among contemporary students. Our study showed that the web was indeed a common starting point, but UTL was the *destination*, as the Library is where the fully accessible content is available.

CIBER does not appear to anticipate the potential impact of new technologies on discovering eBooks, and may be diminishing the problems inherent in licensing and indexing scholarly content, on the web or in libraries. While the recent Google Books settlement may tend to resolve in favor of publishers and pose new risks for library licensing, these deals could also be opportunities for cost-sharing the licensing with publishers as they may see complementary licensing from web users.

CIBER (2008) further concludes (in the *Information Researcher of the Future*) that the Google generation users will use traditional library resources even less than today's students, and that all their research will be done from Web searching. Perhaps this trend seems apparent, but this conclusion avoids two facts we observed that support innovation of library content services:

- That the full content of many scholarly publications will only available through library license agreements, not Google. At some point users must interface with a library service, even if transparently. Libraries must define their role in this information ecology to show their role beyond that of licensing intermediary, but examples of value-added services abound. The innovation research (Phase 3, by discipline) shows numerous opportunities for enrichment of the scholar's experience with Library services.
- That while the library interfaces are considered less than ideal today, new discovery interfaces (e.g., Endeca) and eBook aggregation platforms (eBrary and others) will make a significant difference in usability. Users will have less rationale to *only* use Web searching to locate book titles or journal articles, as library interfaces will provide rapid and focused access to titles and materials that exist within its licensed collection. However, library services must keep pace with web searching (e.g. Google Scholar and Books) in terms of usability, findability (indexing), and relevance.

Furthermore, the conclusion is inescapable that university libraries and Google web searching must not only co-exist, but also integrate. Students show us engrained, even sub-attentive information habits, but they are vendor agnostic – and Google is more of a *habit* than a product or brand. Users do not care which vendor provides a service, but usability and performance efficiency matter. If possible, Google services should be acknowledged and integrated within the UTL services. Moreover, in the future, Google searches (when performed within IP range) should reveal UTL resources indexed by Google. The major publishers are successfully indexing their portals today; libraries should follow. Some universities (e.g., University of Rochester) already do.

Students often start their research with Google searches, but then many start with UTL and online Catalogues when seeking print books. Apparently eBooks are not seen by users as a threat to the actual use of print books (at least in disciplines that use books extensively). The codex continues to command preference and appreciation among scholars, even those that use eResources extensively and keep large collections of eBooks. Numerous new technologies and projects are enhancing the codex book as well as eBooks, and as these technologies progress over time, we should see greater divergences between the valuable and well-loved print books and the efficient and enhanced eBooks. Movements to enhance the codex book exist as well, including Toronto's OCAD, which has initiated a SmartBook research project to enhance the codex book with network accessible features.

We see no reason to assume students would interact with the University services less in the future at least as frequently as they do today – and will find and use innovative information interfaces.

References

- CIBER (2008). *Information behaviour of the researcher of the future*. London: CIBER, University College London.
- Dervin, B. (1992). From the mind's eye of the user: The sense-making qualitative research methodology. In Glazier and Powell (Eds.), *Qualitative research in information management*, (pp. 61-84). Englewood, CO: Libraries Unlimited.
- Harley , D. (2007). Why study users? An environmental scan of use and users of digital resources in humanities and social sciences undergraduate education. *First Monday, 12 (1)* http://firstmonday.org/issues/issue12_1/harley/
- Jones, P.H. (2005). Information practices and cognitive artifacts in scientific research. *Cognition, Technology, and Work*, *7* (2), 88-100.
- Jones, P.H. and Nemeth, C.N. (2005). Cognitive artifacts in complex work. *Lecture Notes in Computer Science, Volume 3345*, 152-183.
- Kaptelinin, V. and Nardi, B.A. (2006). *Acting with Technology: Activity theory and interaction design*. Cambridge, MA: MIT Press.
- Marchionini, G. (2007). Exploratory search: From finding to understanding. *Communications of the ACM, 49* (4), 41-46.
- Norman, D. (1991). Cognitive artifacts. *Designing interaction: Psychology at the human-computer interface*, pp. 17-38. Cambridge Series On Human-Computer Interaction. New York: Cambridge University Press.
- Rowlands, I., Nicholas, D., Jamali, HR, and Huntington, P. (2007). *What do faculty and students really think about e-books?* London: CIBER, University College London.
- Rowlands, I. and Nicholas, D. (2008). Understanding information behaviour: how do students and faculty find books? *Journal of Academic Librarianship, 34* (1), 3-15.
- Sellen, A.J. and Harper, R.H. (2002). *The myth of the paperless office*. Cambridge, MA: MIT Press.

For further information, or inquiries regarding reports or data please contact:

Peter Jones, Redesign Research

peter@redesignresearch.com

See the Smarter Books website: nextexts.com

For updates on the eBooks study, presentations, relevant articles, and publications from the author, from University of Toronto researchers, and OCAD's SmartBook project.