Student and Librarian Attitudes toward Academic Libraries and Information Retrieval:
An Ethnographic Study

Matthew M. Benzing
Information Technology Librarian
Rensselaer Polytechnic Institute

Introduction

It is no secret that libraries are struggling to find their place in the age of Google. Once upon a time the place to find the answers to research questions, from the settling of casual bets or arguments to the needs of students and researchers was a public or academic library, where a helpful reference librarian was always ready to help, a copy of *The New York Public Library Reference Guide* or the *Information Please Almanac* close at hand. The advent of the Internet and the proliferation of online databases that quickly replaced many of the old print indexes and reference sources dramatically changed how librarians went about helping their patrons, but through the 1990s there was still a sense that librarians had a role in mediating searches, in helping the naïve user in formulating their research questions and in navigating the peculiarities and query syntax of a variety of database interfaces. With the phenomenal success of Google and Wikipedia, even this role seems to have been superseded. The increasingly sophisticated search algorithms and natural language capability of Google, and the standardization it has brought to most other search interfaces, has eliminated much of the need for a skilled mediator when it comes to answering frequent everyday questions and not a few in depth research questions.

Public libraries have dealt with this by emphasizing their ties to the community, their status as a free option to book and video stores, and their children's programs. Academic libraries have followed some of these strategies, such as promoting video and leisure reading collections and strengthening their position as a repository for items created by their parent institution. (MacKrell 2001). However, academic librarians still see themselves as mediators, to a greater extent than their public counterparts. Many feel uneasy about the reliance on Google (and this includes Google

Scholar) that is characteristic of most undergraduate and many graduate students. This seems to parallel a wider unease in some quarters about the decline of print media, the weakening of traditional gate keeping procedures and the growing democratization of information flow. The traditional arrangement of academic information into primary, secondary, and tertiary sources which are managed by academic publishers and are essential to publication and tenure are still firmly in place, but they may someday become irrelevant to all but a specialized group for researchers (Sedeh 2007).

So what is the purpose and function of an academic library in the beginning of the 21st century? This question encompasses many angles, including library as place, library as archive, and library as leisure center. This study can only concentrate on a small subset of the wider inquiry. I will be looking at how students proceed in fulfilling basic information needs of the sort that would have traditionally been the province of the library reference desk or collections, and how they picture the library and its use and function. It will also target a single institution with a unique population, Rensselaer Polytechnic Institute libraries. Rensselaer Polytechnic Institute has a curriculum that focuses on engineering and technology to the extent that even students in the Humanities and the Arts typically have a strong technology background. It would be expected that these students would be even more likely to bypass the library as a primary or even a secondary reference.

I am seeking to answer the following questions: where do students go when they have information needs (the obvious answer in "Google", but which tools within Google and how exactly do they use them?)? How do they think about the library? What sort of metaphors do they seem to be using in their conceptualization of it? How do librarians differ in their views and in the ways they approach questions?

Although it may have application to other institutions, this study is grounded in the specific needs of Rensselaer Libraries. While our library has done a limited amount of usability testing, surveys, and focus groups in the past, these have all focused on the design and architecture of the library site, all making the assumption that students are in fact using it. This will be the first attempt at a study that looks at how and when students use the site at all. The hope is that in answering some of these questions librarians will be able to avoid wasting effort on fighting lost battles by competing with Google and other popular resources, and instead concentrate on those areas where we do offer unique services and resources. If a student can find the answer to a question quickly and easily through Google, there should be no problem with them using it. However, if they are paying to get access to information that is freely available to them through our library, or if they are floundering to find data out on the open web that is easily accessible through the library site, our efforts should be focused on highlighting those things.

HCI Theory and the Library Website

According to one oft cited analysis, there are four major approaches to HCI. (Kammersgaard 1988)

1. Systems, where users are simply data entry components of the system

2. Dialogue-partner, where users and designers are seen as equal parties in conversation

3. Tool perspective, where systems are tools wielded by users,

4. Media, where computer systems are viewed as a medium through which messages are passed back and forth between the user and the designer.

HCI developed as an engineering discipline, which placed emphasis on the systems approach. Users were simply part of an engineering schema,

another piece of data. This approach was very modernist in its view of human being as components of a system. The goal in this approach to HCI was to create a system that would anticipate every possible action by the user. Users were seen as predictable and limited to a finite, manageable number of responses to each situation, one part of an overarching system with a role to play. The tool approach ceded more autonomy to the human being, but looked at the system as an artifact with a clearly defined purpose and a limited number of legitimate uses. Again, this was an approach that appealed to engineers (De Souza 2005).

The dialogue-partner and media approach are more geared to the social sciences and provide a more humanistic account of what occurs in human computer interaction. Human beings are not simply cogs in a machine, and computer systems are not simply tools wielded by humans; instead, in both approaches, human computer interaction is really a form of computer mediated communication. While computer mediated communication usually refers to obvious forms of communication such as email and IRC chat, in communication based HCI all types of software applications are seen as communication between the systems designer and the user. (Nake and Grabowski 2001)

Clarisse DeSouza has written extensively on human computer interaction as a form of communication that can be best analyzed through semiotic theory. Semiotics is the theory of signs, of how humans use signs to communicate (some branches even analyze animal communication). There are two main branches of semiotic theory, one following American philosopher Charles Peirce and the other Swiss linguist Ferdinand Saussure. De Souza builds her semiotic HCI theory on Peirce's approach. Without getting too deep into the finer points of the theory, which can be as recursive as pulling a loose thread on a sweater Peirce theorized a three part theory of signs where every sign is composed of the sign itself, the

referent (the thing for which it stands), and the interpreant that links the two together. (De Souza 2004).

Semiotic HCI theory posits that computer systems are communications media and that the computer system itself may also be a message. Semiotic theory sees communication as a process where a sender encodes a message, and then sends it to a receiver through a medium, who then decodes it at the other end. In DeSouza's Semiotic HCI Theory, the message sent is a performing message, which is a sign that may generate other signs in its interaction with the user. It is a surrogate of sorts for the designer that is encoded in such a way that it can sustain a "conversation" with the user.

According to Peirce there are three basic types of signs. Icons (not to be confused with the term as it is used in computer programming) are signs that resemble their referant in some way. It is essentially a sign that evokes a qualitative responsive similar to that of the refereant; therefore, while a GUI icon could be said to be an iconic sign, iconic signs can refer to a wider variety of things. A sound, such as the "whoosh" that accompanies emptying the recycle bin in many operating systems, could be said to be a sign as much as the small visual image of a recycling bin that activates the process.

Indexical signs evoke not the thing itself, but rather something that has a relationship to the thing. Smoke can represent fire, or a picture of a train can represent not a train but instead a railway.

Symbolic signs are related to their referents by a convention of some sort; there is nothing inherent in the sign that would point to the object. Most words fall into this category. There is nothing about the word "water" that would cause someone to relate it to the substance H2O; the convention of the English language has created the relationship, and all speakers of

English recognize the convention. Most words fall into this category, with the exception of onomonopeia words such as "buzz". (De Souza 2004)

Identifying the different types of signs can be helpful in analyzing the communication or miscommunication that goes on in an HCI relationship. For example, if a word processing program features a pair of scissors on its menu bar, it can be said to be a symbolic sign referring to the act of "cutting" text. While scissors do imply cutting which could suggest an indexical sign, the act being referred to is not physical cutting of paper, as would have been the case in the days of print layout copy and pasting, but the virtual act of moving text from one place to another in the document being viewed. The successful communication of this sign depends on the user understanding the "cut and paste" convention that predates the rise of desktop publishing. Other examples would include the "shift" key on most computer keyboards…nothing is being shifted, but there is a reference to print typewriters that physically shifted the position of their keys to type capital letters and special characters. Many programs also still use the image of a floppy disc to activate saving a file, even though floppy discs went out of use some time ago. The convention is still active, so even users who have never seen a floppy disc pick up what that particular sign is refrying to.

In DeSouza's application of semiotics to HCI theory the continual interpretation process is crucial. The computer system is a sign that contains signs, and generates signs as it goes in a continuous process. Since most signs generated in this way will be symbolic, that is, they will make sense only if the user shares and understands the designers conventions "…successful coding and decoding requires that users have an appropriate set of beliefs and expectations about the system's structure and functioning" (De Souza 2004). Computing is mostly a matter of symbolic interpretation, so there is often little more to go than some understanding of the conventions the designer is using. There is very little iconic

representation that does not depend on the user having some grasp and previous experience of a computer system.

Communication Between Librarians and Users

While designers may assume a certain amount of computer literacy and therefore a basic understanding of computer conventions such as "files", "folders", "overwriting", etc., when a computer system is specialized in some way or designed for a specific user population there are additional layers of convention to interpret or misinterpret. This is the situation that exists with library websites. A website has certain conventions; many of these have developed over time, such as the convention that a logo in the top left corner will return a user to the homepage. These are generally recognized by both designers and users of all websites.

But librarians tend to inhabit a different world than many of their patrons. A recent ethnographic study of University of Rochester library patrons (Foster and Gibbons 2006) found a number of disconnects between the expectation and assumptions of librarians and those of students.

The Rochester study looks at the average age of academic librarians and concludes that some of these differences have to do with the culture in which many librarians were raised. At the time that these people were coming of age, the standard model of service was "full service"; when getting gasoline a customer could expect a uniformed attendant to jog out to greet them, pump their gas, check their oil and tire pressure, clean the windshield and send them on their way with a wave and a smile. Customer expectations have changed drastically in the years since, and most students today have come of age in a world of ATMs and Pay-at the Pump card readers. This has affected many industries, from banks to travel agencies. The assumption is that you are on your own when pumping gas or making

travel arrangements; the upside is that you are able to move quicker, set your own schedule, and avoid commissions and higher prices. (Oliver, Livermore, and Sudweeks 2009)

According to the Rochester study, students are looking for a streamlined experience when it comes to information gathering. They are used to Google and other search engines and they expect searching to be quick and painless. They are not interested in finding exhaustive answers to research; the quick, "good enough" answer almost always suffices. This clashes with the training that most librarians receive. Even putting aside the age differences, library schools still train their students to engage in the "reference interview" which librarians view as a professional diagnostic procedure; the goal is to ascertain, through a thorough interview and attention to cues, the true nature of the patron's information need, which may differ from the question as the patron originally formulated it.

The librarian has been trained to think of his or herself as a research professional who may better understand the patron's needs better than the patron. Librarians tend to see themselves as intermediaries between a group of specialized information tools and naïve users who need guidance.

Students, on the other hand, are used to having first hand access to any tools; they don't use travel agents, bank tellers, or expect station attendants to pump their gas.

Another clash in values comes in how librarians view themselves. Reference librarians think of themselves as experts within a particular field, or at least as experts on information sources within their subject area. Students, on the other hand, do not see librarians as experts; when in need of assistance, they will turn to their professors, TAs, or even their parents first. Most students do not seem to have a clear idea of what librarians do, or what their role is in the academic world.

These mutual misunderstanding are bound to have an effect on the communication that happened between librarians and students through the media of a library website. Messages are being encoded by one groups and decoded by a groups with a set of rules and conventions.

Some of the questions this raises are:

> How do students fulfill basic information needs that would have once been handled by reference staff or the library collection?
> How do students conceptualize the library? How does it differ from the way that librarians think about it?

And specifically in the case of web design:

> Is the library designing its website for uses that its patrons aren't interested in?
> Are there areas that need more emphasis?
> Are librarians and students speaking the same language?

Methodology

Seven students were designated for this study:

- A graduate student in Science and Technology Studies

- A graduate student in Communications

- A graduate student in Human Computer Interaction

- An undergraduate in Computer Science

- An undergraduate in Finance

- An undergraduate in Management

- An undergraduate in Communications

Students were given a $5 gift certificate to the library café for participating.

Four librarians were also consulted:

- A reference librarian with a specialty in Business

- A reference librarian with a specialty in Biological Sciences

- The technical services librarian that led the most recent web redesign process

- A technical services librarian with a specialty in technology

All of the librarians have been involved in the implantation and maintenance of the library site.

Students were interviewed and then given a series of information seeking tasks to perform. While performing the tasks the students were asked to "think out loud" and comment on what they were doing and why they were doing it. The interview and the searching were audio recorded. The searching sessions were also recorded through the capture of keystrokes and screen shots with surveillance software. Students were informed that they were being recorded and their online activity was being monitored and signed statements to that effect.

Librarians were interviewed only. They were told about some of the tasks that the students were being asked to perform and were asked how they would handle them. They were also audio-recorded.

Both students and librarians were asked variations of the following questions:

- How do you use the library?

- What's the research process like for you?

- How often do you use books in your research?

- What is the library?

- What is it that you think librarians do?

- What is the internet?

- What kind of information, do you think, cannot be found on the internet?

Students were asked to perform the following tasks:

- Find a peer reviewed academic journal article on gender and game design.

- Find information on how to use SPSS software

- Your instructor has asked you to view the film *Nanook of the North*. how would you get a hold of it?

- Find the audio recording. *Chinese Songs and Dances: Music from the 56 Ethnic Groups of China*.

- Find this article:
  Doessel, D. P., Helen Travers, and Ernest Hunter. "The Use of Touch-Screen Technology for Health-Related Information in Indigenous Communities: Some Economic Issues." *Prometheus* 25:4 (2007): 373-392.

- How late is the library open on Saturday night?

- How would you find out how to apply for a patent?

- In your reading you come across the word "dharma", and you want to understand what that is. What would you do?

- Find a book on the "digital divide" in South Asia.

- How would you find out how many males under the age of 19 were arrested for assault in 2007 in New York State?

Findings

Many of the findings from this research confirm the findings of the Rochester study. Several statements by librarians confirmed that they do think of themselves as full service attendants. One of the reference librarians compared being a librarian to being a waiter or waitress:

> "I think of myself as a reference librarian, and I do instruction so I think a piece of it is like you have this menu and people come in and there is a piece to that, if you can be a good waiter or waitress you probably have some ability to juggle things and be a good reference librarian when it's busy "

This service orientation also showed when this librarian was asked where she would tell a patron to look for an article on Gender and Game Design. She began describing how she would help the student find the information they really wanted, and lead him or her into a reference interview

> "I think if you had the opportunity to have a consultation with a person, as to whether asking questions about if they had already found any articles, or sort of get a sense for what they were looking for, what they were doing, who it was for, what kind of course, did the professor have any suggestions, although I think that it would, no matter who came with the question that would sort of be a prerequisite, having a reference interview that would talk about those things…There might also be a piece where if they knew nothing about this, there might be a piece where they might look in an encyclopedia first to know more about it, and the idea of getting ideas."

She gave an example of helping a student who was looking for information on the Irish Potato Famine

> "Well, I talked to her and to just get started. I'll tell you what it is. She, she wanted something on the Irish famine of the 19th century, and she was writing a essay, let me say that, and we talked a little bit about the catalog, and it was something I knew a little bit about so I knew we had some book in the collection, and I showed her how to look for books in the collection and how to identify subject headings, and we looked at Wikipedia, and it looked... I know people have mixed feelings about Wikipedia. But generally, it's pretty good, I use it a lot personally, and I like it. We started to do that and then I asked her how much time she had, and other sorts of questions, and suggested she, she had to go so I mentioned some social science indexes and for something like that I might even, she had to go, she had to go finish a quiz, so I said I can send you what we've talked about, which I did and I also, suggested a couple of indexes, actually ProQuest Research Library had quite a bit, and we talked about the fact that she's trying first to find a topic and then to get a spin on it, so we started broad and then went down, which she'll probably use later and I told her she should come back and talk to me."

The librarian was behaving according to a service model that measured her effectiveness not by how fast she got the students in and out, but rather how exhaustive her research strategies were. To use her own waitress analogy, she was not behaving like a fast food cashier, taking orders and processing them as quickly as possible so the customer can be on their way, but rather like a waitress in a full service restaurant who is content to let

customers take their time and have a full course meal, dessert and after dinner drinks included.

This particular librarian had no problems with using Wikipedia; in fact, in the case just quoted she mentioned that she had been going to Wikipedia because the online version of the Encyclopedia that the library pays for was having technical problems. Most of the other librarians interviewed seemed to be comfortable with Google and Wikipedia and thought they had a role to play in the research process.

> "I think it [the library website] should also have Google Scholar figure much more prominently" – Technical Services Librarian

One librarian was disenchanted with Google and Wikipedia and thought these resources were distracting students from better resources:

> "Sometimes when I go into Google or some of our electronic resources I think, why don't I just get a book. And I find it.
>
> Oh, I think there's a lot they don't know about. When I teach me class students always say well I didn't know about this, I didn't know about that…I think that there is a lot that we offer that they don't have a clue about. And I think a lot of it is the fault if the professors, they take these papers, and they're 100% Google, or Wikipedia, and there's not a journal article among them. I think that's a disservice. They shouldn't do that.
>
> Students go to Google. If we're lucky they go to Google Scholar, but students go to Google, and they look at the first two screens. That's ridiculous.
>
> No, no. I don't think they have a clue. I think they think that anything that's on Google is reputable, I don't know why they think that, and anything on Google is fair game that they can

use for papers…they need to go and look at peer reviewed journal articles, but they have no idea what that means."

All of the librarians agreed that most students have no idea what peer reviewed journals are, although they differed on how much this mattered. Most of the librarians thought that undergraduates were well served by Google Scholar, at least.

Students did indeed rely quite heavily on Google and Wikipedia. Almost all of the students in this study began their research for each of the research tasks by going to Google, Google Scholar, or Wikipedia. Even though many of these students discussed how the library was an important information source, when it came down to performing their own research they almost always went to Google.

An undergraduate student talked about how well organized the library site was and how the tabs "lead you to just the information you need". However, when asked to find the gender and game design article she did not go to the library site and click on the clearly labeled tab "articles", but rather went to Google Scholar, saying

"Actually I am working on a paper that's due Friday and my professor told me about this. It's very useful."

Not only was she beginning her research with Google Scholar, she was doing so at the suggestion of her professor. Despite some of the remarks made earlier by a reference librarian about how Google was doing a disservice to students, at least some of the students in the study seemed fairly sophisticated in their use of Google. A graduate communications major said:

"Yeah. So I I usually go to Google Scholar, just to sorta get the lay of the land, because I feel that that gives me, if I'm looking into a new topic, gives me an idea of, if there's a ton of research

on it, or not much research on it, generally is there one name that keeps popping up, or is this stuff where I'm looking at this one phenomena, but it looks like everyone's looking at it from this other perspective. So, just sort of a lay of the land type thing. And then, I'll try to get stuff off of Google Scholar a lot of times, but I can't, just because of permissions, in which case, I have an ACM Library membership, so sometimes if it's in ACM I'll just jump in there, or, I will go to the library web site. Usually the library first, just because they have the ACM, so it's sort of included."

This student is using Scholar for a preliminary literature search; a function for which it would seem to be well suited. It is also worth noting that five of the seven students studied were able to find a reputable academic article on gender and game design within a few minutes of being asked by using Google or Google Scholar. The Graduate STS student used the subscription database Web of Science instead, and the undergraduate computer science used Google but since he had no understanding of what an academic journal article is he was unable to sort through the search results that he was getting.

Students seem to feel that everything is available on the Internet. When asked what sort of information cannot be found on the Internet, students answered

"What kind of information cannot be found on the internet? How many hairs I have on my body. That's about it. " – STS Graduate Student

"Maybe really obscure information. That would probably take a lot of digging to do. " – Computer Science Undergrad

"Yeah, information on how to tie together the information, I think sometimes you can find, like for example in research you

can find a hundred articles that might be, books or whatever, that might be really relevant to your research, but you can't necessarily find the answers on what's most important, right?"
– Communications Graduate Student

"Geez, I don't know" – Communication Undergraduate

"I think most everything can be found on the internet, just some stuff is really difficult to find" – Management Undergraduate

While some students discussed the difficulty in finding certain types of information on the internet (seemingly meaning the kind of information that can be accessed through a Google search) there was an overall assumption that all information, or all useful information is somehow accessible online if you have the time and patience to find it. Librarians were much more pessimistic about the amount of information freely available over the Internet.

"There is a lot of licensed material that is not available without authorization. Older documents that are not digitized. Oral information from individuals. Any information that's not digitized. A huge amount of information" – Technical Services Librarian

"Depends on what you think of as you could talk about the deep web which is locked away, and you can get to some of subscription databases through the internet, but I think when most people think of the internet they are thinking of information that is freely available. A lot of historical information you can't get to on the internet. Proprietary information won't be on there either. Personal information, although you can find scary amounts of personal information on the internet." – Technical Services Librarian

Librarians and students also differed in how they thought about libraries. Librarians talked about library as place, but tended to focus on the library's role as a purveyor of information

> "A library is a focus point for information, a place for people to get information." – Technical Services Librarian

> "I guess I think of it as a collection of resources" – Technical Services Librarian

> "Well, it's not just print books anymore. It's a conglomerate of information in all kinds of formats, how you find information on anything you want to find information on" – Reference Librarian

When students were asked "What is a Library?" there answers were much different:

> "A place where they keep books?" – Computer Science Undergraduate

> "A library is a place where they have books and stuff for the general public to use" – Communications Undergrad

> "A study space with research materials" – Finance Undergraduate

> "A housing for a potential community…quiet…houses lots of knowledge…good place to have meetings or study" – HCI Graduate

> "A physical manifestation of the Internet" – Management Undergraduate

And when asked what librarians do, once again the answers diverged.

> A lot of it isn't obvious, a lot of it is on the computer. A lot of times you can figure it out for yourselves, but sometimes you can't sometimes you need someone to show you how to do it."
> – Reference Librarian

> "Ahhh, basically I'd say, return books to shelves." – Computer Science Undergraduate

> "Well, I think that librarians are pretty busy because they have to keep track of the systems that keep track of all the books. They also have to figure out what kind of new books and new articles will fit into the professor's research and the graduate students research on campus, and once those come in they have to make sure that they go into the system and that they're catalogued, and I guess they have to do some sort of special binding work" – STS Graduate

Librarians tend to think of themselves as working with electronic resources…one librarian said that she spent 85% of her time with electronic materials, 15% with print…but students seem to think of the library as a house of books, and librarians as people who order, organize, and shelve books. As in the Rochester study, students did not think of librarians as subject experts. When asked who they would go to for help with their research, all of the students listed their professors and TA's first. One also mentioned the Writing Center and one mentioned his mother.

Students also seem unaware that the library houses audiovisual materials. When asked to find the film *Nanook of the North* or the audio recording *Chinese Songs and Dances: Music from the 56 Ethnic Groups of China*, students went to Netflix, Amazon, The Pirate Bay file sharing site, and Google.

Some eventually decided to try the library site (the library has both of these items in its collection). Even when asked to find a particular book, most of the students went to Google Books or Amazon instead of checking at the library.

Students were also unaware that the library website contains research guides created to help them in various areas; in the test students were asked to find some statistical information and information on patents. Students did not know that they library site contained guides on finding these kinds of information.

Despite the fact that the students barely used the library site, they were still able to complete many of the assigned tasks. In particular, students using Google, Google Scholar, or Wikipedia were able to find articles on Gender and Game design, training materials for SPSS software, patent information and the definition of the word "dharma" without much trouble. They also were able to find an article based on its citation. Some of the tasks that students had trouble with were finding the Chinese audio recording, and the statistics question.

Conclusions

Students and librarians are indeed speaking a different language. Librarians have a different view of the library, of the internet, of how research is done, and of their own role in the university than students have. This has an impact on how the library website is constructed. For example:
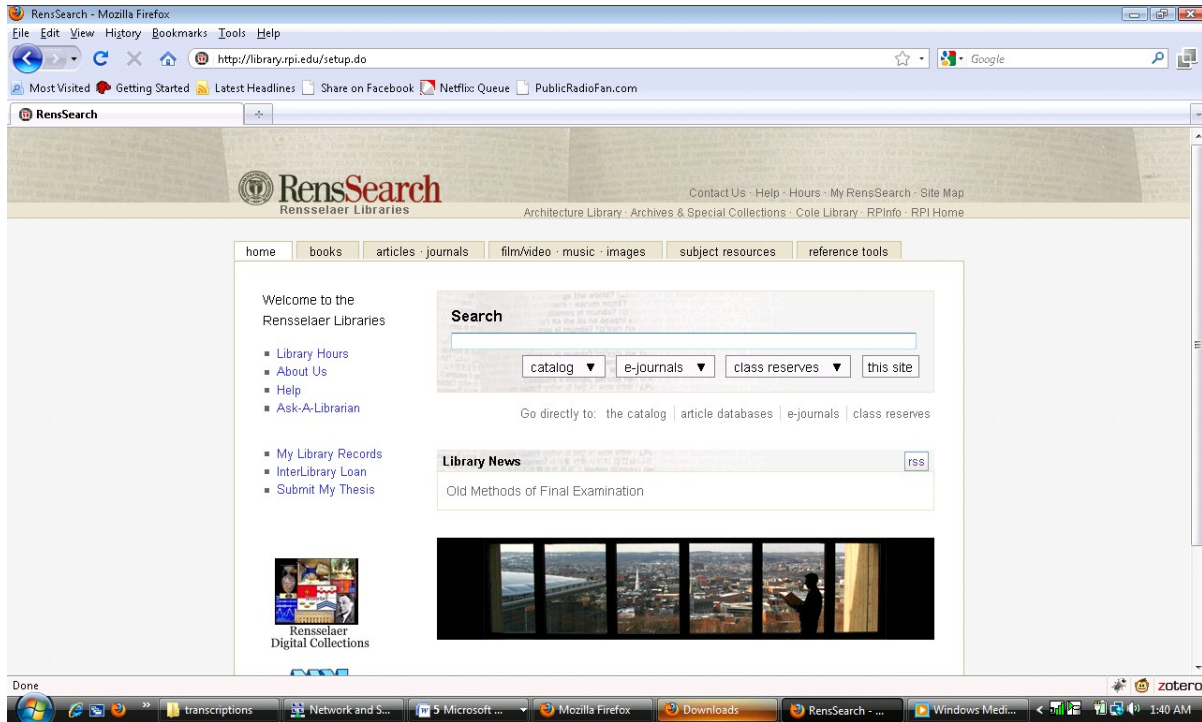
The search box on the top level library page requires the student to decide up front whether he or she is looking in the catalog, e-journals, class reserves, or the site itself. Google does not require the user to think and organize the search up front. The structure of the library site reflects the way that librarians work, the lengthy reference interview through which the librarian decides what question the patron really wants to be asking. Students, who are used to the Google method don't understand why they can't just type a search phrase into the box and get back information on the subject they are researching, whether that information comes in the form of books or journals or other forms. In terms of semiotics, the search box is a symbolic sign; there is nothing in an empty text box that would suggest anything to someone who had never used a computer or the web and had no understandings of the conventions of those media. The way the symbol is interpreted, however, differs between the librarians and the students due to the different cultural assumptions that they bring to their interaction.

The same could be said for some of the divisions on the top level page. Many librarians also think in terms of browsing; when asked about the tasks the students were performing, they would point to the different tabs on the top level page as good places to start. They seem to think in terms of browsing, as one would do with an old card catalog, where items are neatly divided into subject areas. None of the students asked had much of an idea about what the "subject resources" or "reference tools" tabs led to. Several offered that they knew that you could not take reference books out of the library, but most had no clue what "reference" meant or why they would use that tab. The word reference signifies a certain type of information resource to a librarian, a resource that supplies brief factual information. To the students the word signifies, if anything, a physical book that cannot leave the library. Again, a miscommunication based on a different decoding of the sign involved. Students seem to picture information as an unorganized mass; several described the internet as unorganized and "chaotic" yet they also considered it their primary information source, and none of the students interviewed could think of much if any information that was not available there. The assumption seems to be that categorization is not important if a good search engine is available.

The fact that students were able to get satisfactory results on a number of the research tasks using Google suggests that the internet search engine may not be the end of civilization as we know it, especially in its Scholar form. Whether students know it or not, the library pays for and manages many of the subscriptions that allow them to click through and get much of the premium content that Scholar points to. It may be that Scholar provides a better interface to that material than many of the subject specific databases that the library website features. The library website does include links to Google Scholar, but as one of the librarians in this study noted, it

might be to the library's advantage to display it more prominently, perhaps on the front page.

There are technical and economic reasons why the library can't simply put up an all inclusive search box,

> "The main weakness of our website is the main weakness of all library websites, that all of our information is locked up into little silos so it's necessary for people to search in different places depending on what their looking for, but people aren't aware of what that structure is or what those sub silos are so they don't know that we keep track of our ejournals in one place and that we port that information to the catalog …you can't put in keywords and search all of our articles…the functionality is not quite there yet in getting the results back in a fast and understandable way; it's not something that comes prepackages with the things we usually buy…maybe because those tools are not that satisfying yet. One of the reasons they're not that satisfying is that it works better to have all your data compiled, all the data you want to search compiled into a single index the way Google does; they don't actually search the web in real times they search a cached version of it which they've put all together and compiled in such a way that its east for them to search but we can't really do that with our stuff because we buy it from other people, like all the resources that we search are, um, you know, we have Science Direct over here and Ebsco over here, and when we buy Academic Search Premiere from Ebsco we're actually paying for that collection of resources but also like the metadata, and they don't want to just hand over that metadata to us for us to do whatever we want with it, because I think that feels kind of scary to vendors right now, and there's really not a business model for that right

now, but if you had smart people, like programmers, and you had all the metadata from all the library databases, they could maybe smash all those into one combined index and provide a more satisfactory like, you know, federated search if you want to call it that." – Technical Services Librarian

Solving this problem would undoubtedly make the library more popular among its user population. Librarians also need to decide if there are places where their effort is being wasted. If all of the students in the study were able to find reliable information on how to apply for a patent why does the library need to maintain pages on this subject? On the other hand, all of the students floundered on finding the answer to the statistical question, yet the answer was easily findable on a link from the libraries statistical information page, as well as in several print volumes within the library. This is an example of an area where the library is providing unique information and not competing in a contest with Google and Wikipedia that it cannot win. Also, reference librarians need to find a way to publicize the fact that they are subject experts. None of the students in this study mentioned a librarian as an example of the kind of person who they would go to if they needed research help, but reference librarians are often aware of resources that professors and TAs may not know about.

Librarians know that an academic library is more than a study room with books that no one ever reads. Students know that Google and Wikipedia are often very useful in obtaining basic information. If librarians can accept that they cannot compete with Google and Wikipedia, if students can learn that academic libraries do have unique resources that cannot be found through Google, and if the library website can be retooled to recognize both of these advances, it will greatly benefit students in their academic work and librarians in their professional satisfaction.

Works Cited

De Souza, Clarisse Sieckenius (2004). Semiotic engineering: bringing designers and users together at interaction time. *Interacting with Computers, 17.* 317–341

De Souza, Clarisse Sieckenius (2005). The Semiotic Engineering of Human Computer Interaction. Cambridge: The MIT Press.

Foster, Nancy Fried and Gibbons, Susan (2007). *Studying Students: The Undergraduate Research Project at the University of Rochester.* Chicago: Association of College and Research Libraries.

Kammersgaard, John (1988). Four different perspectives on human-computer interaction. *International Journal of Man-Machine Studies*, *28*: 343-362.

McKrell, Lindsay. *Public Libraries Adapting to Change : From Cultural Institutions to Agents of Change in Learning and Community Development* (2001). Edinburgh: University of Edinburgh.

Nake, Frieder, and Grabowski, Susanne (2001). Human Computer Interaction Viewed as Pseudo-Communication. *Knowledge-Based Systems, 14.* 441-447.

Oliver, Dave, Livermore, Celia and Sudweeks, Fay. (2009). *Self-Service in the Internet Age: Expectations and Experiences.* London: Springer.

Sadeh, Tamar (2007), Time for a change: new approaches for a new generation of library users. *New Library World, 108*(7/8). 307-16