

Observing Student Researchers in their Native Habitat

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Abstract:

This paper discusses the challenges student researchers face when attempting to locate relevant e-resources, and the challenges university libraries face in ensuring that academic e-resources are accessible and understood by student researchers. The paper presents original quantitative and qualitative research on the ways in which students' access and use academic e-resources, and a comparative analysis of the role of open Web search engines in academic research.

Introduction – New Realities for Academic Libraries

Libraries face enormous challenges in the information age. Due in part to the mass adoption of information technologies and the development of highly refined open Web resources like Google, student researchers, who are highly savvy about online applications, enter the university library with firmly established expectations for library databases and electronic library resources. When library resources don't live up to these expectations, the entire library community suffers. Even as the quality and quantity of electronic library resources improve, libraries struggle to remain vital in the research practices of students.

The proliferation of electronic content has shifted the balance of power in libraries to end-user researchers. Student researchers appreciate and expect the simplicity of open Web search engine interfaces, the seemingly infinite volume of content these resources display, and the ease with which content can be accessed.

Today's student researchers were born in the Digital Age. While the generations that precede them still marvel at the sophisticated utility of the Googles and the Amazons of the open Web and are only dimly aware of Facebook and MySpace, student researchers not only take these environments for granted, but also believe that they are the baseline by which other content resources can and should be measured.

Student researchers are keenly aware of the importance of effective time management. They understand that their academic success depends upon their ability to find and synthesise a large volume of information, judge its relevance, and incorporate it into their academic experiences. Effective time management is the only way a student can balance all of the competing priorities of their academic work with the added demands of employment and their social lives.

Students come to the university from under-resourced school districts that do not fully prepare students for online academic research. With little in their prior academic experience to assist them, they are confronted with a bewildering and overwhelming array of electronic library resources, with little knowledge of what the resources are, and few ideas on how best to sort through them. Combined with the time pressures under which these students operate, library research quickly devolves into a frustrating, unproductive exercise that irretrievably degrades the student's academic experience.

The Role of the User Experience

Our research at ProQuest has demonstrated unequivocally that students place a high value on the user experience when working with research tools. Student researchers have an overwhelming preference for those online resources that most closely resemble their expectations of what their user experience *should* be. To the extent that scholarly resources are not accessible in ways that are consistent with either their expectations or their research behaviours, students will make do with weaker lower-quality resources.

That access and discovery solutions for electronic scholarly resources do not meet student expectations is not in doubt. The dilemma is how the online presentation of library electronic resources can keep pace with the open Web applications and search tools with which students are comfortably familiar. For most students, the

experience of using the library's online resources to do scholarly research from the library's Web site is a step back in time. Despite the possibility that higher quality, more effective resources are available through the library, students are inclined to turn to resources that are more accessible.

This tendency to reward those resources that meet or exceed user expectations in favour of higher quality research materials is something we observed in our research time and time again. Conversely, many students ultimately opted out of research via the library due to the *barriers and complexities in attempting to locate and access the appropriate resource* through the library's online website. While students recognise that the library offers higher quality, more appropriate scholarly resources, they cannot work through the complicated choices – what they may view as ambiguous options. Library e-resource pages not optimised for usability are also not the least among the obstacles. Attempts to simplify or explain their proper use, or how to navigate through the library website to get at the right resources for their particular research task, often further disengage student efforts or reduce their tolerance for using them.

The Need for User-Focused Access and Discovery Solutions

The lack of access and discovery solutions that meet the user's expectations is widespread. Research materials cover the entire subject matter spectrum; there are thousands of academic resources, each with their own access points and search tools. Deciphering which resources are appropriate for any given research task is complicated; only the most information literate researchers with in-depth awareness of the electronic resources can navigate this tricky landscape. The unintended result is that the sheer volume of online scholarly resources discourages – rather than encourages – use by student researchers.

Barriers to information access leave the student researcher with the impression that the library does not contain appropriate, useful and accessible research resources. Moreover, these impressions persist, sometimes over the length of a student's academic career, and put libraries at a higher risk of becoming irrelevant to students who perform academic research.

The impacts of these failures go well beyond the student researchers' personal experiences. When the access paths to these scholarly collections are so complicated that they discourage student use, not only is the student's academic experience diminished, but so also is the value of the library in general. Providers, like ProQuest, that supply scholarly research databases also feel the impact of these failures, as do the researchers themselves. If research materials are not appropriately disseminated, students lose not only the benefit of the work that has been done in the past, but also the opportunity to extend the research in the future. The effects are felt throughout the entire research community.

Observing Student Researchers

As part of our research at ProQuest, we wanted to examine the role of the library in academic research and the way in which today's students use it. We performed extensive qualitative and quantitative analysis in an effort to understand the subjects' library use. Simply asking student researchers about their research experiences would not produce enough useful information.

We wanted to observe students when and where they conducted their research, so we met our subjects in libraries, computer laboratories on campus, in coffee shops, and in their own living spaces. Meeting students in their own research environments only underscored the evolving role that libraries serve, as content – which at one time was housed only in the library – has migrated to online and electronic delivery. With near-ubiquitous access to the Internet, students no longer need to be physically present at the library to conduct research.

Research Objectives

Our research objectives were three-fold: first, we wanted to determine how and where electronic library resources fit into the students' research habits. We were interested in learning the point at which students engaged research resources. We also wanted to know which resources the students used. Did they use primarily online resources? Did they seek the assistance of a librarian at any point? How did they arrive at the resources they used? Did they enter from the library start page?

Second, we wanted to discover the factors that played a significant role in the students' selection of resources. Without revealing the ProQuest connection to the electronic library resources, we wanted to know which resources students chose and why they chose those resources over other options available to them. Further, we were interested in learning how students evaluated the available resources and how this research carried forward into the students' final research products.

Finally, we wanted to examine the roles of open web search engines in student research. We wanted to understand the students' use of open web search engines and what impact, if any, they had on the students' research.

Contextual Inquiries

To collect data, we engaged in both qualitative and quantitative studies of student research behaviour. Our qualitative research consisted initially of contextual inquiries where we observed students as they conducted research in the environment of their choice. This research was conducted from November 2006 through April 2007. We recruited 30+ students from six universities using newspaper and online advertisements that gave no indication of a connection to ProQuest or the library. We also used generic email addresses in our communications with the students. We recruited both undergraduate and graduate students in a variety of academic disciplines. Collectively, our participants possessed a range of research skills, from novice to advanced.

Initially, our observers were physically present while the students conducted their research. To conduct the observation, our researchers carried with them a laptop computer to record notes. In a larger, repeat study, the subjects were observed remotely using a software application to enable observation and recording of the student's computer screen.

In the initial study, each volunteer subject, who was engaged in research for an actual class assignment, agreed to conduct research in the presence of an observer for a two-hour period of time. Students were asked to identify blocks of time within a three-week period where they would be available to meet with an observer. Some students were observed at a university library or computer laboratory on campus.

Off-campus observations were also made in various Internet-capable locations like coffee shops and even in the subjects' private residences.

In the second study, we recruited students from five geographically diverse universities by using anonymous, targeted advertising on the Facebook Web site. Participants were asked to commit to a 90-minute research session, which would be observed remotely, using a remote desktop observation software package (UserVue) that allowed us to watch all activity on the subject's computer screen unobtrusively while the student conducted research. As in the first study, participants were required to perform research for an actual class assignment.

To participate in the study, the student was required to have broadband access to an Internet connection, the ability to connect to all online library research tools they would normally use on or off campus, and the ability to allow observation software to be loaded onto their computers. We used anonymous email for all contact with our study subjects and scheduled 90-minute time blocks that students identified as being convenient for them. The students who participated in remote observations were also connected to our observers via a telephone line. Multiple observers remotely viewed sessions in the second study.

The UserVue software is a non-resident client application, so once the observation session was terminated, the observation client was unloaded, leaving the student's computer unchanged. The UserVue software captured each 90-minute session for later analysis.

From the students' perspective, the presentation of applications on their computer screen was virtually identical to what they would see on an unobserved computer. The only difference noticeable to the student user was a small flag at the top of their screen with the UserVue logo, a positive indication that their computer screen was being viewed, and control buttons that allowed the student to ask for help with the UserVue application, and to quit the UserVue application.

From the observer's perspective, the UserVue interface showed the actions of the study subject, and a button to mark actions that were of particular interest or that required additional review within the session capture.

Qualitative Findings

Our research findings revealed a wealth of information about how students engage library resources to conduct academic research. With regard to our objectives, we found that students find electronic library resources to be highly relevant to their academic research, but our observations supported the conclusion that provisions for selecting and accessing electronic database neither meet the students' user experience expectations nor promote the same easy access that open Web resources do.

When students can access electronic resources appropriately and completely, they provide a highly efficient means of discovering relevant content and accessing full text. This aspect directly complements the students' desire to use the most time-efficient resources possible.

Factors that Influence Student Research Strategies

Our observations showed that four major research factors influence where and how a student initiates research. Library outreach and information literacy play an important role in the initiation of research tasks. Students benefit from library instruction when these services are presented to them, but they do not often seek out this type of assistance on their own. For example, a student will make good use of library information, collection information, and especially electronic resource that are presented to them in a class, if a professor invites a research librarian to speak.

Input from professors also plays an important role in the students' choice of research tools. Our findings indicate that students place an unusually strong importance on resource recommendations they receive from their professors. These recommendations are often internalised by the student, but unfortunately are not always applied in light of the appropriateness of the resource for the task at hand.

Brand awareness of electronic resources impacts a student's choice of how and where to start research. Students possess a relatively high level of brand awareness when it comes to electronic resources. Most of the students we observed could name several branded research products. However, students are rarely able to distinguish between resources at the database level. Students may continue to use professor-recommended electronic resources for years and for all research tasks, in lieu of more sophisticated, contextually appropriate research resources that are designed to address specific academic disciplines.

Finally, Google and other open Web search resources play an important role in a student's approach to research. Our observations indicated that students use Google in one of three ways: as a primary research tool, as a source of supplemental information, and as a handy look-up or reference tool and navigation aid.

The Role of Google

Our observations showed that students use Google as a primary research tool when the quality of the research is not of significant concern. If the overall quality of research sources is not important, students prefer the Google user experience – even when it produces weaker research sources – over a more time-consuming or complex search for superior research data.

Students also use Google as a primary research tool when they are unaware, or insufficiently aware of library e-resources. In the absence of more appropriate resources, students use the tools that provide the best user experience in the least amount of time.

Finally, students use Google as a primary resource when their experiences with library resources are bad. Although the library catalogue is intended to help users identify resources within the library, it often misleads users. Most online library catalogues have a simple, Google-like search box that is attractive to users. Unfortunately, users don't understand the limits of the library catalogue search, or what its primary purpose is. They use the resource with the expectation that the catalogue will produce specific article-level content, when, for the most part, the catalogue is simply an inventory of the resources a library has within its collections.

Why Students Choose Google

Students who have difficulty navigating the library's e-resources Web page are unlikely to have a positive experience using the library to locate appropriate research materials. Multiple links, the over-abundance of "how-to guides", or the presence of poorly designed help pages contribute to the difficulty students have while attempting to access electronic resources. Navigation difficulties often prompt users to turn to open Web search engines for primary research.

We also observed that a major barrier to successful research experience is the student's misunderstanding or ignorance of the requirement to authenticate to a resource, or connect to it using the library's proxy server. Many students are simply unaware that their library has licensed access to research databases and that they need only to identify themselves properly to gain full access to the desired resource. When the students attempt to use the database without authenticating or using the library's proxy server, the resource does not work as expected, produces only limited results or offers the student researcher the opportunity to purchase the desired content. Experiences like these often lead students to return to Google as a primary research source.

When not using Google as a primary resource, students still incorporate it as a supplement to their research. Frequently, students use Google as a final "check" to verify that their primary research has not overlooked an important concept or point.

Students are most likely to use Google as a handy look-up tool to locate the URLs of known resources such as government sites, major newspapers, and library resources. Students also use open Web resources such as Google and Wikipedia to collect answers to specific questions. When students encounter unfamiliar terms or concepts, seek definitions, or want to complete a citation for an article, we commonly observed them turning to Google for this kind of information. Students indicated clearly that they did not consider the Google results or information gleaned from Wikipedia to be authoritative, but they simply needed some piece of general information to explain or define an element of their research.

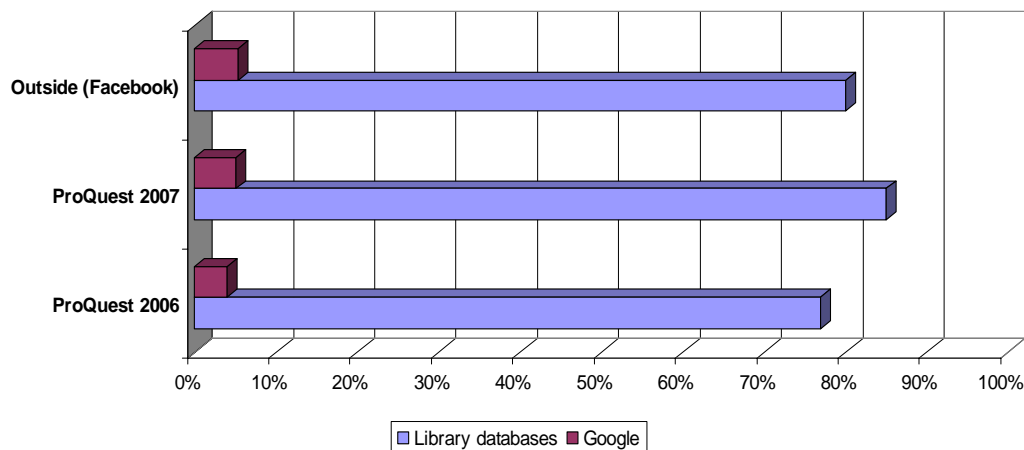
Quantitative Research

In addition to studying the qualitative experience of working with electronic library resources, we wanted to compare student researchers' perspective on electronic library resources versus web search engines. To measure this, we surveyed more than 10,000 end users in three different surveys. Users were invited to participate in the survey via a link on the ProQuest user interface – once in March 2006 and again in March 2007. Additionally, in March 2007, participants were recruited through an anonymous flyer that targeted users at three major universities via Facebook. The majority of respondents were undergraduate students, followed by graduate students and academic librarians. The remainder of the respondents identified themselves as business professionals, professors, community college users, high school users or public library users.

Content Quality and Credibility

Participants were asked to consider library databases and Google, and identify which resource had better quality and credibility of content. In all three survey groups, users overwhelmingly acknowledged that library databases provide higher quality, and more credible content. Over time, more users may recognise library databases as being a superior source of research information. In both the 2007 survey of ProQuest users and the anonymous Facebook survey, a higher percentage of users indicated that library databases provided better quality content, compared to the 2006 survey responses.

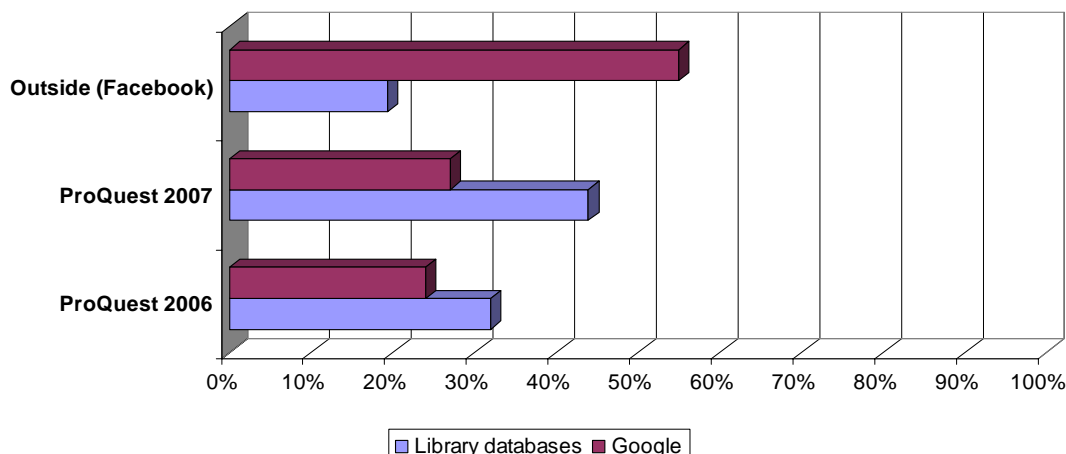
Has better quality and credibility of content



Content Currency

We also asked end users about the currency of the content between the two resources. In the 2006 and 2007 ProQuest user surveys, respondents believed that the library databases contained more current content, and that perception increased significantly between 2006 and 2007. In the Facebook survey, end users reported that Google and other web search engines provided more current content than did library databases.

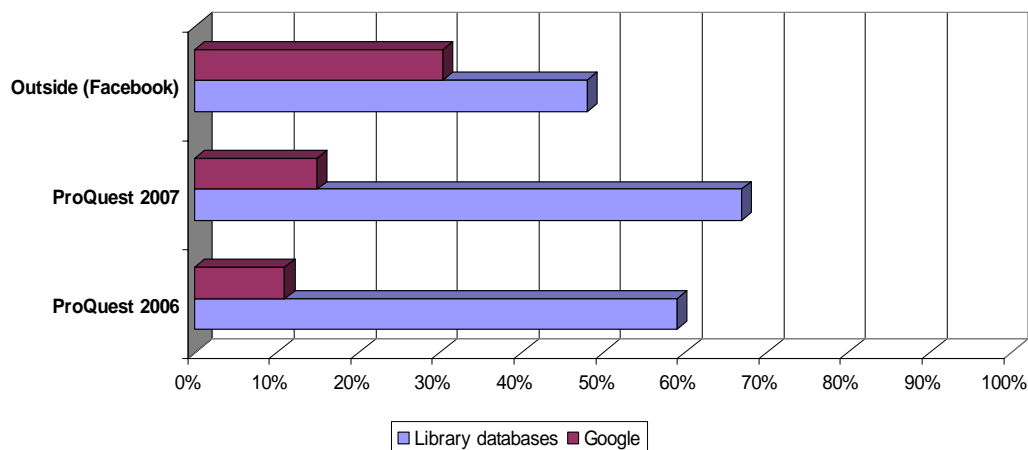
Has more current content



Usefulness of Search Results

Survey participants were asked about the usefulness of search results from library databases versus those from Google. In all three survey groups, respondents indicated that library databases produce better search results. A comparatively larger proportion of respondents in the Facebook survey, however, indicated that Google's search results were superior to those from library databases. This may indicate that student researchers less familiar with library databases turn to Google as an accepted discovery resource.

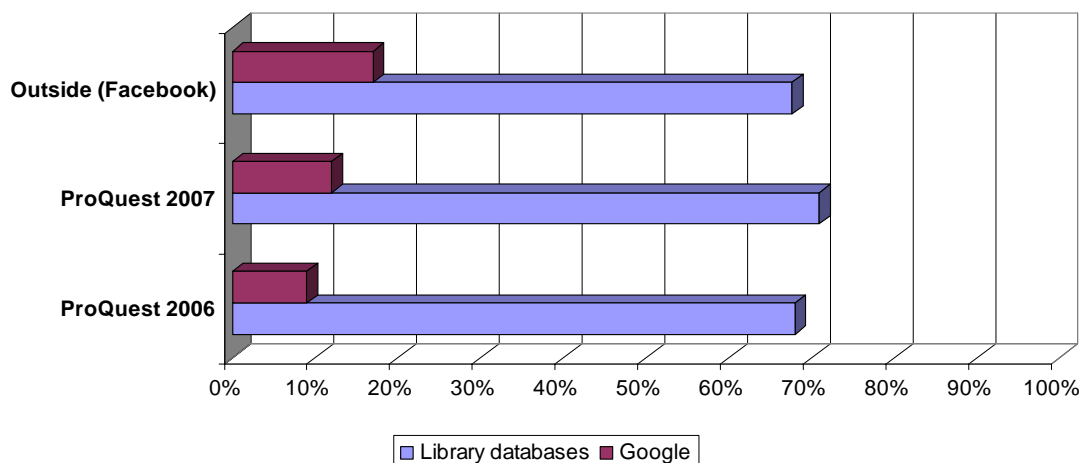
Has more useful search results



Usefulness of Research Tools

We asked survey participants to identify which resource had more useful research tools. The vast majority of respondents in all three survey groups identified library databases as having more useful research tools than Google did. Again, a comparatively larger proportion of respondents in the Facebook survey indicated that Google's research tools were more useful, perhaps due to less exposure to library electronic resources.

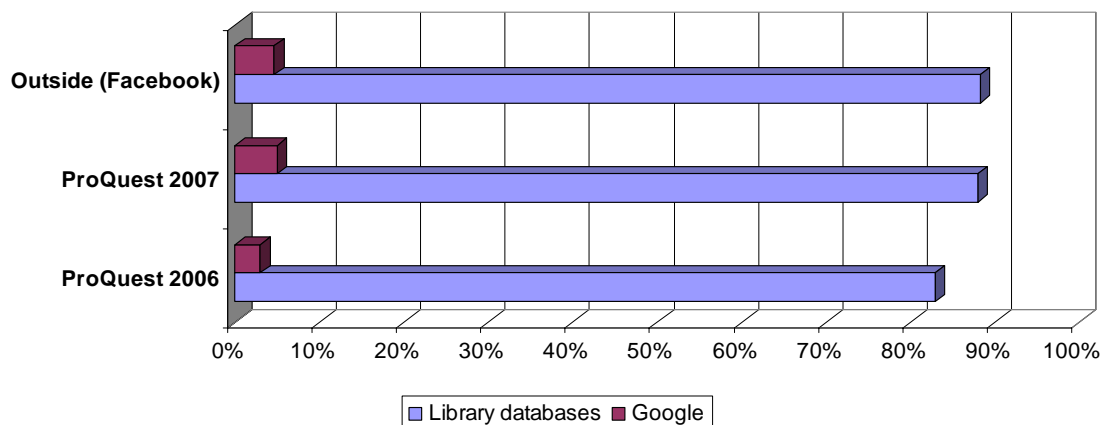
Has more useful research tools



Preferred Research Tools for Academic Research

Survey respondents were asked to identify which resource they preferred for academic research and course assignments. In all three survey groups, respondents overwhelmingly indicated a preference for library databases for their course work and academic research.

Is preferred for academic research and course assignments

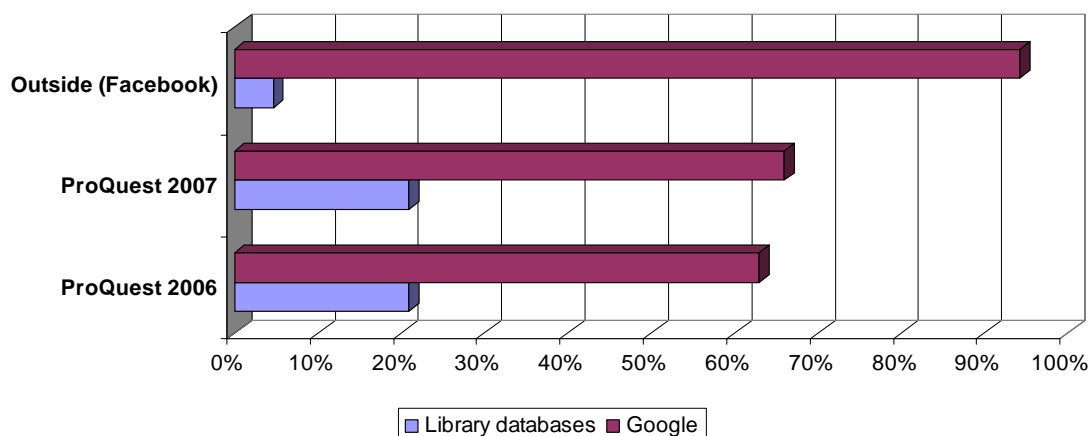


(Interestingly, in both the 2007 ProQuest and Facebook surveys, a comparatively larger proportion of respondents indicated that Google was their preferred resource. A number of factors could explain this increase, including a growing preference for simplicity in searching; a qualitative improvement in Google's resource; an increasing number of students who are unaware of library databases or unable to draw relevant search results from them; or perhaps adapting strategies which better enable use of Google as a research tool – such as limiting the search domain to .org or .gov to increase the likelihood of discovering more credible content sources – compensating for the innate weaknesses of web search engines.)

Quick Look-Ups, Fact-Checking and General Information

We also asked respondents to identify which resources they preferred for quick look-ups, and explanations of terms and unfamiliar concepts. Not surprising, all three respondent groups indicated that they preferred Google's resource to library databases. These are the tasks for which Google is best suited.

Is preferred for quick look up of facts and unfamiliar terms or concepts



Quantitative Findings

In all, users believe that they are more successful in their research when they use electronic library resources than when they use other types of resources. This is supported by users' reports of satisfaction with their research; their access to full-text scholarly content; and the extent to which library databases allow the users to conduct their research in a time-efficient manner.

Our quantitative research indicated that Google and other similar open Web search engines have a place in student research. Google has not displaced the perception that library databases offer superior quality content and research support. Users are highly satisfied with the results of their Google searches but not because it excels at supporting the academic research process. Among other shortcomings, users recognise that they cannot get seamless access to full-text scholarly works. Likewise, Google's search results are not sufficiently refined or categorised in a way that increases the time-efficiency of the research process.

Observations

Our survey results and contextual inquiries support the conclusion that major barriers to end-user success in using library resources exist. These barriers frustrate the student research experience and must be mitigated to ensure that all academic researchers have access to the full value of the electronic resources; possess a general awareness of the differences between various electronic resources; and can use the resources in a time-efficient way.

User authentication raises a major barrier to research success when using library resources. Many users simply do not understand that they must authenticate to the resource to gain full access, or connect to the resource via the library's proxy server. Adding further confusion is the fact that some electronic resources will offer limited results without requiring authentication. Unauthenticated users sometimes incorrectly assume that their limited results represent the full value of the resource.

Current provisions for access and discovery may be insufficient or may suffer from design flaws that prevent users from finding and using electronic library resources to their fullest potential. Many student researchers use the library Web site as a starting point for accessing electronic library resources. However, the electronic resources may be presented cryptically or without *compelling* guidance to help the student researcher quickly choose the appropriate database, understand what the resource contains and what it is used for. Unfortunately, many sites still lack well-planned, contextual navigation to guide the user to the correct resources.

Persistent Problems

Much work remains to be done in the area of research support for users of electronic library resources. A persistent problem exists, preventing the resources of the library from being used successfully and efficiently by student researchers of all experience levels.

E-Resource Web Pages

The design of provisions for access and discovery of library e-resources should always strive to facilitate a swift and intuitive user experience. We do not mean to

suggest that existing library Web pages exist without this goal in mind, but a well-conceived, well-executed design solution that simplifies the growing array of resources, directs the user to the correct resources and provides unencumbered access to resources appears to be beyond current reach.

Were this a simple task, contextually sensitive library e-resource solutions would already be in place. Each user comes to the library with a different research task, different needs and a unique combination of resource experience and awareness. This only increases the challenge libraries face in providing meaningful resource guidance that enhances the user experience, simplifies research tasks and improves resource accessibility for all library patrons – especially considering that users expect seamless, intuitive choices without need for reading screen language, online help or user guides.

Access and Discovery

Access and discovery issues should be approached from the user's perspective. Libraries must be especially sensitive to the circumstances of incoming students. For many new students, the university library will be a resource unlike any other they have ever seen or used. The school and community libraries they have used to date serve different purposes, and require a different skill set to discover and manage the information contained within. In contrast, the university library may contain hundreds or thousands of electronic resources, and new users – with little or no practical research experience – are unlikely to engage a librarian for assistance.

While finding the electronic resources poses one set of problems, students consistently experience difficulty accessing the resources they do find. Simple actions, like authentication, or accessing a resource through a proxy server, can make major differences in the success of the research experience, yet many students are unaware that these resources may not allow full access without them.

The Need For Continuing User Education

Educating students about the particular strengths and weaknesses of library resources, their intended uses, and the discovery and selection of more appropriate alternatives should continue to be a priority for libraries in order to improve the student research experience. Many students are aware of a few electronic resource brands, however they may remain in the dark about a product's specific purpose. It may not occur to students that electronic database products rarely take a "one-size-fits-all" approach to cataloguing academic resources. Instead, they may labour for years under the assumption that one particular e-resource is equally fit for every task. Students using the wrong tools may incorrectly conclude that library e-resources are not quite right for their needs when search after time-consuming search produces few relevant articles.

Library Marketing and Other Successful Strategies

One highly effective strategy for promoting the proper use of electronic resources is library marketing. Library marketing is often conducted informally in the university community. Students find that a classroom visit by a research librarian delivers much needed information. If this information can be delivered early in the student's academic career, countless hours of wasted effort on the part of the student researcher can be eliminated.

Effective Outreach

Effective outreach programmes that are designed to increase user awareness of library resources, and programmes that encourage the teaching staff to incorporate library resources into their classroom presentations can improve the student's library research experience. Guided tours or self-guided tours of library resources, well-constructed resource access pages, e-resource Web page designed that are optimised to simplify the process of discovering and selecting appropriate research databases, identification of resources that require authentication for full availability and local resources like live chat that allow users to receive online assistance are all ways in which libraries can potentially simplify and improve the user's research experiences.

Summary and Conclusion – The Value of Simplicity

Our end-user survey research clearly indicated that students highly value library databases over web search engines for research. Moreover, our contextual research demonstrated that students were more successful in their research when using library databases...finding more relevant, scholarly material more quickly than when using web search engines such as Google.

However, what we found while observing students was uncertainty as to where to access the right database for their research task at hand. Students simply didn't know where to begin their research. Those who were fortunate (or enlightened) enough to find their way to the list of databases on the library website were overwhelmed or perplexed by the number of (seemingly obscure) choices.

Comparing results of the two studies brought to light a clear opportunity: increase the awareness and accessibility of library databases and the quality, satisfaction and time efficiency of student research will improve.

Our research in this area shows unequivocally that users gravitate to simplicity and a positive user experience. Although they will attempt to compensate somewhat for access barriers that surround electronic resources, student researchers will accept lower quality resources from less trusted information providers when their research attempts have been frustrated by negative user experiences with higher quality, more trusted sources.

Collectively, the library industry needs to collaborate on a concerted effort to help student researchers, by simplifying access and discovery of electronic resources. Focusing the overwhelming number of e-resource choices can improve student research access throughout a student's entire academic programme.