

CHAPTER 15

Understanding NextGen Students' Information Search Habits: A Usability Perspective

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In her study of 2,877 first-year students at New Mexico State University, Kate Manuel (2005) finds that although students are sophisticated seekers of information in their daily lives, they hold deep misconceptions about locating and using sources in most academic settings. Manuel cites dozens of research studies that characterize students' existing information literacy (IL) practices in terms of deficit, failure, or defiance and provocatively questions whether pedagogy guided by this portrayal of students can successfully address the root causes of their struggles.¹ Manuel criticizes the body of IL research for not addressing failures in IL pedagogy from a student-centered perspective.

This troubling dynamic represents only part of the deep systemic challenges that pressure NextGen students and educators (writing instructors *and* librarians) alike. This chapter argues that students avoid researching from the digital library in large part because of the

design of digital library tools. To illustrate, we offer our own experience pursuing a usability perspective to better understand students' responses to digital library interfaces. The series of usability tests we describe in this chapter demonstrates how our NextGen student participants perceived the functionality and use of the digital academic library through the lens of their interaction with Google, which they perceived to be a well-designed digital tool. We found that they failed to analytically study the utility of either Google or the digital library card catalog for academic research.

Our participants interacted with the digital library in ways that puzzled us as writing studies specialists (Patrick and Andrea) and computer engineers (Yetu and Andrew). Further discussions with our writing studies and librarian colleagues led us to conclude that not only did our NextGen participants misperceive key differences between consumer and academic information-seeking tools, but the design of both directly contributed to this problem. This conclusion forms the basis of this chapter's thesis: Usability testing is one way to better understand the information-seeking habits of NextGen students. Implemented at the programmatic level, usability testing stands to inform strategic questions about the information architecture and use of research interfaces.

Our usability studies were part of a cross-disciplinary PhD seminar at the University of Louisville (U of L) between the Department of English and the Department of Computer Engineering and Computer Science. The U of L is a metropolitan research university with three campuses and six libraries holding collections of more than 2.2 million items. The University Libraries are U of L's principal information repository and provide information services to more than 15,000 undergraduate students, including a large nontraditional and commuter population. The Libraries' holdings are located using the Libraries' Online Public Access Catalog (OPAC), also known as Minerva. As part of the Libraries' integrated management system known as Voyager, Minerva is a prepackaged digital catalog sold by a global vendor, the Ex Libris Group.²

The academic professionals for whom Minerva is designed understand that it gives easy access to a valuable collection of information not realistically accessible otherwise. We have observed that our colleagues believe that while Minerva is not an elegant interface, it *is* functional and downright revolutionary compared to the paper card catalog it replaced. The NextGen students who helped us test Minerva, however, treated it with fundamentally different logic. Even though they could use the basic features of Minerva proficiently to find sources, nearly all said they prefer to use Google to complete their research-writing projects. Our usability tests revealed the near ubiquitous influence of Google on our participants' search habits and behaviors. We began to refer to this influence as the "Google Effect" and came to realize that regardless of our original intention to study the design of Minerva, what we were really studying was the direct influence of Google, and the information-seeking habits and behaviors it fosters, on our participants' use of Minerva.

Literature Review

We approached our study armed with anecdotal observations that NextGen students had problems using Minerva to find sources for research-writing coursework. This resistance both intrigued and frustrated us (and our colleagues), as we were invested in the value of Minerva and used it productively in our own academic work. Though we had general usability research to guide us at the time of our studies, existing usability studies were far afield of research-writing pedagogy and higher education contexts. In early 2007, when we conducted our usability studies, the closest thing to a usability perspective on research-writing and IL was a prescient article written in 1994 by Cynthia L. Selfe and Richard J. Selfe Jr., which predicted that the meteoric rise of digital interfaces would have a transformative effect on classroom practice and educators who ignored this influence did so at their own risk. In 2009, Susan Miller-Cochran and Rochelle L. Rodrigo edited a collection that assessed the progress of usability

research during the intervening 15 years since Selfe and Selfe's 1994 study. The collection shows that the usability literature in writing studies focuses almost entirely on professional writing environments, not the writing classroom or digital information-seeking tools. Given the central role of usability research in developing and improving user-centered designs (Kuniavsky 2003; Norman 2002), we need to do more to study how NextGen students are using research interfaces for academic work.

In Miller-Cochran and Rodrigo's collection (2009), Douglas Eyman argues that writing and IL educators must rearticulate usability as a way of looking at writing tools used for specific purposes and conduct usability tests under actual, local conditions of use, not just in experiments (see Chapter 7 by Mary Lourdes Silva and Chapter 8 by Ruth Mirtz for studies that begin to do this work). The ethnomethodological approach Eyman advocates would produce a wealth of narratives that show how students navigate research-writing interfaces. In the same collection, Selfe and Selfe (2009) return to their 1994 argument to add that usability could serve as a discourse and approach for writing teachers to connect pedagogy and practice to the evolving research and writing tools used by students and other writers. Though we did not have the benefit of this instructive collection for our own usability studies, we share its argument that usability testing strengthens the strategic position of educators, writing teachers and librarians particularly, with respect to information technology because of the nearly complete migration of the shared work of these disciplines to digital tools, all of which are mediated by interfaces. Beyond strategic technology considerations, educators who improve their understanding of NextGen students' information-seeking habits and behaviors can rethink their own assumptions about how students use these tools to complete research-writing work.

Educators who ignore NextGen students' technical and ideological assumptions fail to understand why NextGen students seek information in ways that are not optimal for academic research-writing tasks. Selfe and Selfe write, "English teachers cannot be content to understand

the maps of computer interfaces as simple, uncomplicated spaces" (1994, 500). Usability testing reveals that digital interfaces are not only complicated spaces, but also *contested* spaces. Interfaces are ideological contact zones that influence teaching and learning possibilities because they shape the perception and behavior of the people who use them. Our own design and usability testing process, which we explain in the next section, attempts to reveal the ideological dimensions of our participants' use of Minerva. Following the description of our design and testing process, we discuss how Google played an unavoidable role in participants' search behaviors. Finally, we return to the idea of constructing a usability effort at the programmatic level, where interface-related issues with NextGen students can be addressed more effectively through regularly committed resources and multidisciplinary expertise.

Usability Test Methodology and Design Prototypes

Our usability study consisted of a series of three sets of usability tests over the course of 6 weeks with three groups of NextGen students who were completing a research-writing assignment in U of Ls required first-year writing course. For the first study, Andrew and Andrea observed students' digital library browsing experience and found an unexpected issue related to Minerva's design. They found that participants were surprisingly familiar with the basic functions of Minerva, but they used these functions with noticeable reluctance. Yetu and Patrick then tested Minerva's Robotic Retrieval System (RRS) interface and confirmed that participants showed few problems using Minerva for basic search tasks, but retrieving books from the RRS archive so confounded students that they gave up before completing their process. We found four sources of their confusion:

1. The RRS sub-interface from a Minerva record was placed outside of students' visual scanning pattern.³
2. RRS features had low "information scent," or predictive cues about content that was not immediately available (Pirolli 2007).

3. Participants needed more guiding information earlier in the requesting process.
4. Participants easily triggered Minerva's generic error message, which they found to be discouraging and ambiguous in meaning.

To address our shared interest in studying NextGen students' understanding and use of Minerva, we combined our two similar research efforts and created three multimodal tutorial designs for a potential Minerva help system. Given the trend of using multimodal tutorials for digital library tools, we wished to test whether this type of learning support could help students successfully use Minerva while outside of the classroom. Because our research showed that U of L students already had a basic command of Minerva, we created tutorials that gave step-by-step advice for using the Boolean AND operator in Minerva's advanced search interface.

Recruiting Student Participants

For our theoretical sample set in the third series of tests, we recruited eight NextGen students (Matty, Nicholas, Ashlie, Brittany, Mort, Samantha, James, and Raquel), all of whom had some previous exposure to Minerva through coursework, as shown in Figure 15.1. These participants mostly described themselves as experienced seekers of online information, but they lacked confidence searching and using information in an academic setting, particularly when forced to use Minerva to find sources. Six participants routinely avoided using the U of L Libraries, two occasionally used the main campus library, and one student used the public library whenever possible. One student, Raquel, had not used Minerva in 3 years to locate a source, despite several classroom introductions to it.

Designing Multimodal Minerva Tutorials

While conducting our first two series of usability tests, we consulted with U of L librarians and library staff, both on- and off-the-record, about our findings. We met with and took advice from the Libraries'

Test Type & Order	Participant	Gender & Age	Computer Experience	Minerva Experience
Video Help				
1	Matty	M/20	High	Low
2	Nicholas	M/19	Medium	Low
Text-and-Image Help				
3	Ashlie	F/18	Medium	Medium
4	Brittany	F/18	High	Medium
5	Mort	M/20	High	Low
Interactive Help				
6	Samantha	F/19	Medium	Medium
7	James	M/19	Medium	Low
8	Raquel	F/22	High	Very Low

Figure 15.1 Test order and participant data

assessment team, the circulation supervisor, and the Minerva administrator. Consulting with our campus librarians gave us two additional design parameters for our tutorials based on the Libraries' own constraints and concerns:

- The visual design and functionality of Minerva could not change. The design of Minerva is static with respect to individual institutions' needs. The Libraries purchase products from Ex Libris with few options for customization, and any changes to Minerva would involve a major capital planning and approval process.
- The Libraries did not have the resources at that time (due to a developing state budget crisis) to implement any additional student services. If an eventual tutorial system were to be implemented, it would have to be departmentally housed and maintained. Our design decisions needed to be made accordingly.

Though critical perspectives exist on the usability of online help systems and video instruction (see Choi and Johnson 2006; Grayling

1998), we had no firm expectations about how writing students would respond to the introduction of different modalities in Minerva. Because we had no directly relevant usability research to draw from, we tested two initial tutorial designs and then created a third design based on the lessons of the first two. We used the Firefox web browser scripting extension Greasemonkey (available at www.greasemonkey.net) to skin our designs over a working Minerva session and embed our tutorials into Minerva's webpage interface. Greasemonkey allowed us to create a near-seamless visual integration and design continuity between individual tutorials and Minerva.

For each design, Yetu scripted pages and Patrick created the textual and visual elements of the tutorials. We retested and tweaked tutorials while Andrew managed the administrative aspects of the project. Matty and Nicholas tested the first design—a 3-minute annotated screencast with voiceover narration explaining Boolean search with a step-by-step visual example. Ashlie, Brittany, and Mort tested the second design—a step-by-step text example with annotated screenshots demonstrating a Boolean AND search. Samantha, James, and Raquel tested the third design, which combined the improved elements of the first two designs—better text formatting, image borders, and three highly modified 10-second videos—with the functional Boolean interface (see Figure 15.2). As participants searched using the tutorial interface, their results opened in a new window that cascaded to the right of the original page.

Usability Test Procedure and Activities

As shown in Figure 15.3, we segmented the usability test procedure for the tutorials into five activities. Our test moderator (Andrea) used semi-structured interview techniques to guide participants through each activity, reminding them frequently that it was the interface being tested, not their search skills, and that they should experiment frequently. She spoke from a prepared script, asking participants to think aloud and share their experience verbally with the team.⁴ When participants appeared frustrated, intrigued, or did something unusual

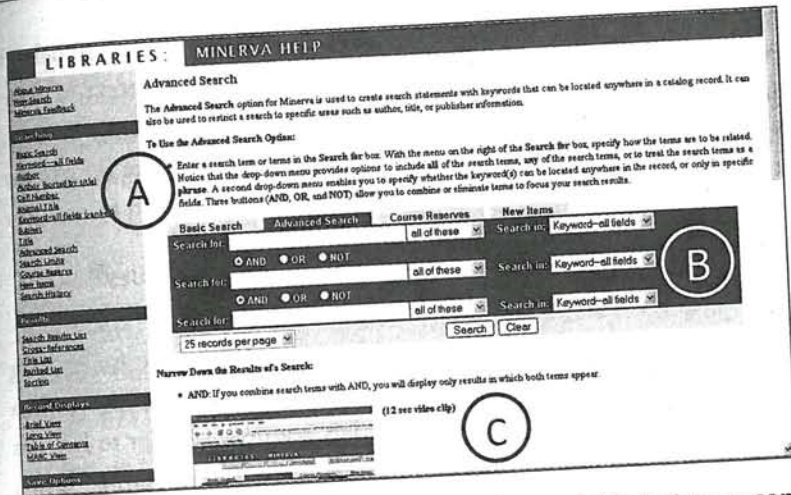


Figure 15.2 Interactive help page for Minerva (This test page consisted of [A] static text to explain the search features, [B] a fully functional clone of the actual search tool to facilitate experimentation, and [C] annotated screencasts with voiceover narration to demonstrate features.)

with Minerva, Andrea asked simple but specific questions to elicit more nuanced information. The rest of the team observed silently while taking notes and recording participants' interactions with the tutorials and Minerva.

Background Discussion (Activity 1)

Each usability test began with a background discussion where participants described their prior experiences with digital technology, computers,

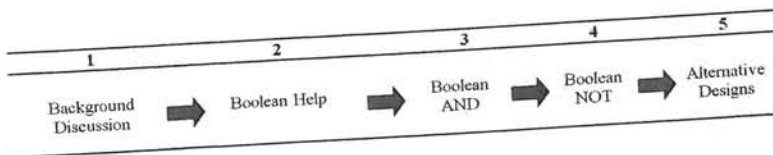


Figure 15.3 Usability test activities

online research, the digital library, and Minerva. This information helped us frame participants' interactions within the larger IL context of their lives. The data from these questions were valuable to our interpretations of students' actions because they revealed additional aspects of IL, like the Google Effect (discussed later in this chapter), that we began to consider as our study progressed.

Minerva Help (Activity 2)

Participants explored their assigned Minerva tutorial page for as long as they wished. When they finished browsing the tutorial, Andrea asked them to verbally review the tutorials' features in order to help us determine which aspects of it they focused on while browsing. When necessary, she elicited more information with questions about their actions, intentions, and personal opinions concerning design features.

Boolean AND Search (Activity 3)

Participants used the Boolean AND search function to locate sources on Queen Elizabeth II that also featured her marriage. When participants sought assistance, Andrea guided them with conceptual advice about Boolean searching and possible options (e.g., trying a different Boolean feature), but she avoided discussing actual solutions to the usability test activities.

Boolean NOT Search (Activity 4)

Participants then used the Boolean NOT search function to find sources about Martin Luther, the 16th-century theologian. We designed this test to oblige students to use the NOT function to exclude sources from the much larger Reverend Dr. Martin Luther King Jr. collection, which an ambiguous "Martin Luther" search would produce first in the search results.

Design Discussion (Activity 5)

Each usability test concluded with a design discussion between participants and the entire team. These discussions typically ran 25 minutes as the participants explored the tutorial designs they did not officially

test. They offered their opinions on the tutorials, Minerva, and (inevitably) Google. We encouraged participants to be candid, and they were as eager to discuss their distaste for our tutorials as they were to offer their bleak assessment of the usefulness of Minerva.

Study Results: The Influence of the "Google Effect"

Our NextGen student participants were puzzled about why we would take the time to design and test tutorials for an interface like Minerva, which by their standards lacked the visual sophistication, elegant design, and responsiveness of Google. Google was their "design model," the tool that had shaped their understanding of information seeking and which they preferred in their own everyday information-seeking lives. Participants' reliance on Google directly contributed to their perception of Minerva as a "LastGen" interface, even as they acknowledged that it must hold some utility for multiple instructors to expect them to use it for their research-writing. They revealed to us that they only used Minerva to the minimum extent they felt would suffice, or simply not at all. Participants did not see Minerva as a personally useful resource because they have a radically different design sense, aesthetic, and set of expectations for functionality that Minerva does not provide. It feels counterintuitive and counterproductive to them, while Google provides immediate content that can be incorporated into a research-writing project. Minerva returns a catalog record that must be taken to the largest library in the metropolitan region (where they can seek assistance or, if they don't ask for help, wander alone through the maze-like stacks). In short, the research process that Minerva supports is far more complicated than what participants had come to expect through their experience of instant results from Google. The instruction our participants received from writing teachers and librarians did not engage this difference between the research processes; thus, it did not present the participants with compelling reasons why they should include Minerva in their research strategy.

Immediacy and "Information Scent"

Participants' avoidance behavior can be better understood by considering Peter Pirolli's idea of information scent theory (2007). Pirolli, of Xerox's Palo Alto Research Center, explains how information scent theory works: "[It] refers to the detection and use of cues ... that provide users with concise information about content that is not immediately available ... guiding users to the information they seek" (68). Pirolli argues that information scent plays a vital role in a person's decision about how long he or she will use an interface before making a decision to move on. Participants' primary complaint about Minerva was the lack of immediacy of information, and their frustration was visible as they searched. James summed up his experience best when he said that he was "looking for something right now," as he combed through record after record. All other participants had difficulties with information scent in Minerva records as well. They mistook existing links for content and looked for contextual clues that Minerva did not provide (e.g., content previews, page ranking by algorithm, and search suggestions). Information scent theory suggests that participants simply gave up on Minerva because they did not feel the value of the information it provided (i.e., OPAC records) warranted the frustrations of using it.

Simplicity and User Optimization

Participants showed a strong desire to optimize their search activity and believed that Google's simple, intuitive interface helped them accomplish this goal. In contrast, they saw Minerva as a complex system, which contributed to their perception that it was difficult to use. Minerva's design relies on drop-down menus, radio buttons, and sub-menus to select important search options. If a participant fumbled their search syntax, they received an opaque error message, which did not tell them what they did wrong or how to correct their mistake. Google, on the other hand, required no understanding of syntax to retrieve results and never produced an error message. In fact, when

they misspelled search terms (as two participants did), Google provided suggestions to correct the mistake.

Participants' experiences with Google's minimalist interface and algorithmic presentation of records that are rich in information scent led them to make incorrect assumptions about the relative differences between Google and Minerva. Most participants believed that Google and Minerva provided equivalent access to secondary sources, when, in fact, they provided access to two different corpuses. Participants also believed that Google provided superior access to these same information sources because of its modern design and its ability to deliver content directly. These two assumptions led to surprising exchanges, like Matty's somewhat indignant confusion over why we would even bother testing a LastGen artifact that was still a text-only interface. He cut Activity 4 short to demonstrate how Google worked, inviting us to usability test it if we wanted to see (in his opinion) what really works for research. Nicholas, Brittany, James, and Raquel also talked about their desire to use Google rather than Minerva because they were convinced that it provided a significantly lower opportunity cost for them to use compared to Minerva. With Google, participants could decide which content to select with a few mouse clicks, but the "cost" of using Minerva involved making a trip to the campus library and locating and browsing each source or using Minerva to link to other academic information-seeking tools for online journal content. Of all eight participants, only Mort said that he would use Minerva to access print library sources (though he hadn't yet), and only Samantha said that she regularly used Minerva's digital databases to access journals for her research-writing.

Based on our study, we concluded that while our participants were sophisticated seekers of information for nonacademic projects, their everyday information-seeking habits severely interfered with their use of library tools for academic research-writing. Matty, Samantha, and Raquel, the most sophisticated information seekers of the participants, could easily have completed the exercises using Google, but they would have done so without making an informed choice about how the

Libraries' holdings could help them. For example, they did not know that U of L Libraries provide students with a (prepaid) collection of academic information resources that far exceeds what they could access through Google. Our participants did not yet possess the particular IL skills or perspectives necessary to function with the degree of research autonomy expected of them within their first-year writing classes. They demonstrated a strong need for direct instructional support that did not address *how* to use Minerva, but, instead, *why* doing so would ultimately improve their research experience and the intellectual product of their efforts (for an example of student-centered scholarship in service of these goals, see McClure 2011).

The Struggle of NextGen Students Using LastGen Interfaces

U of L considers the ability to sustain an extended and critical inquiry involving secondary sources to be a fundamental general education skill.⁵ Presumably, no one expects NextGen students to acquire this skill through Googling information, but the Google Effect looms large in the research-writing classroom. Our conclusion from three series of Minerva usability tests was that what our NextGen student participants needed most was not additional technical information-seeking skills, but critical perspective to help them contextualize their own information-seeking behaviors and develop a reflective information-seeking practice. For instance, when Ashlie discovered that she could not click through entries in the Minerva records, she said, "Now what I really want to do is go to Google to type it in and see what I get." Students like Ashlie need guidance through their usability concerns and problems. Understanding these moments as breakdowns in interface usability can prepare educators to demonstrate how and when to use popular tools (like Google) and ensure that students are comfortable using academic tools (like digital library card catalogs) when they need to do so to meet course objectives (Corbett 2010). Even Raquel, who successfully completed the search tasks, said, "Instead of just giving me the facts—the author, the title—I don't know—Some kind of

description would help. I'm not going to want to go to the library and find every one of these books to see what it has." Despite 3 years as a part-time student, Raquel had never used the U of L Libraries to find a source. What our study reveals is that usability issues in Minerva directly contributed to her not doing so.

Even if the case can be made for insisting students learn to use a digital tool like Minerva, the case for why the design of these types of tools should remain static cannot. The influence of these technologies on student information-seeking habits will start the first time their hand touches the device. Mike Kuniavsky writes that "usability is good design" (2003, 20). Good usability promotes engagement, but in the case of Minerva, an inflexible interface, which was not designed with pedagogy in mind, has failed to keep pace with the development of intuitive interfaces found on the devices of NextGen students' everyday lives. Despite the success NextGen students might have with Google, the challenge of helping NextGen students adapt to the institutional realities of poorly aging tools is unlikely to abate soon because the outcomes of general education are unlikely to forsake the campus library. Furthermore, open access to academic information remains elusive, and few incentives exist for vendors like Ex Libris to address student usability issues to improve student access to the collections mediated by the OPAC it sells. As one librarian said off-the-record about Minerva, "We don't like it either, but it's what we have to work with—and that's not going to change."

Usability Studies as a Programmatic Solution

Best practices and professional support are needed for studying the relationship between student research-writing and the interfaces that mediate these activities. As Selfe and Selfe first wrote in 1994, understanding the interfaces of academic life is a necessary part of teaching the new digital scholar. The need for a disciplinary usability perspective and local programmatic solutions increases with each new academic information product handed to educators with the expectation

that they will somehow make it work. Usability advocates in the writing studies and IL fields can push for student-centered design, pedagogy that is informed by systematic study of digital tools, and collaborative projects that draw diverse perspectives to usability issues. Without the support of writing programs and libraries, however, this work will continue to occur slowly and in ad hoc fashion. While usability testing can be done quickly as a way of defining usability problems for further study, designing actual solutions with programmatic impact requires planning and a commitment of time, expertise, and technological resources.

The studying of human-computer interaction is, by nature, a multidisciplinary activity. Usability studies can be used to gather and share evidence that addresses usability concerns around common concerns, like the impact of certain digital tools on student learning. For future usability studies of research-writing tools, we believe librarians should not only be consulted, but also directly involved with the testing of any digital library tool. First, librarians often provide NextGen students' introduction to library tools, and their insight into student behavior is complementary to that of writing teachers. Second, having librarians on board would help to shape the collective response to usability testing inquiries.

Usability studies designed with this level of support can be used by educators across disciplines faced with similar issues and similarly intransigent tools. These common concerns are a natural opportunity to pool the skills, perspectives, and resources of multiple stakeholders. Bringing attention across academic disciplines to how students actually *do* use interfaces could shift our understanding of how to better connect new students to the information architecture of their academic lives.

Endnotes

1. Reviews of relevant literature from writing studies are found in this volume: Randall McClure (Chapter 1), and Barry M. Maid and Barbara J. D'Angelo (Chapter 13).

2. Ex Libris Group's Voyager solution is one of the primary digital information infrastructure providers for libraries across the United States, Europe, and Asia.
3. For more information on the visual scanning patterns most often employed by consumers of web content, particularly research using eye-tracking "heatmaps" to indicate spots of prolonged focus, see Jakob Nielsen (2006).
4. The ability of a think-aloud protocol to faithfully relay inner speech or correlative cognitive development is unlikely to regain traction in writing studies literature (see Long and Flower 1996; Flower and Hayes 1981; for a response, see Bartholomae 1985; Bizzell 1982). Though the discipline is wary of researchers using think-aloud protocols to cognitively map or theorize writing through *etic* data (i.e., data gathered for generalization), these methods are widely used in the field of human-computer interaction as one method of gathering *emic* data (i.e., data locally meaningful). For more on an adaptation and application of the think-aloud protocol for studying NextGen students' research behaviors, see Janice R. Walker and Kami Cox's Chapter 16 in this book.
5. Like many other universities, U of L places a strong emphasis on finding and using secondary sources in its outcomes for the entire general education program (see University of Louisville 2012 for specific language).

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