Andrew T Murphy. Perceived Usability of Online Library Resources Among First-Year Students. A Master's Paper for the M.S in I.S. degree. May 2022. 37 pages. Advisor: Dr. Fei Yu.

This paper describes a mixed methods usability study of the UNC Libraries website in the context of first-year writing courses, which are required for undergraduate students at UNC-Chapel Hill. The study used a survey and contextual interviews to investigate the perceived usability and user experience of the UNC Libraries website for first-year writing students.

First-year students who were taking the first-year writing courses ENGL 105 or 105i were surveyed about their use of and perceptions of the UNC Libraries website as they encountered it in their first-year writing course. Contextual interview participants were recruited from the pool of survey respondents. In the contextual interview sessions, participants were asked to complete several tasks designed to be similar to those associated with completing coursework. Survey and contextual interview data indicate that users are able to complete course-related tasks using the current UNC library website; however, their perceived usability and experience was not great.

Headings:

Website use studies

Academic libraries

Accessible web design

Online information services

PERCEIVED USABILITY OF ONLINE LIBRARY RESOURCES AMONG FIRST-YEAR STUDENTS

by
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A Master's paper submitted to the faculty
of the School of Information and Library Science
of the University of North Carolina at Chapel Hill
in partial fulfillment of the requirements
for the degree of Master of Science in Information Science.

Chapel Hill, North Carolina

May 2022

Approved by

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Dr. Fei Yu

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Disclosure:

This study was not conducted by UNC Libraries or the UNC Department of English and Comparative Literature, nor was it conducted by anyone affiliated with the UNC Libraries system or the UNC Department of English and Comparative Literature.

Introduction

The First-Year Writing Courses at UNC

According to the UNC English and Comparative Literature website, “All first year students at UNC Chapel Hill take English 105 or 105i, a course designed to introduce [them] to academic writing on our campus.” (UNC, n.d.). English 105, “English Composition and Rhetoric,” is designed to introduce “students to academic writing across the disciplines of natural sciences, social sciences (or business), and humanities.” English 105i is a specialized course for Honor’s students, transfer students, and students who know what major or profession they want to pursue. The principal difference between English 105 and 105i is that 105i has a “more intensive focus on the discipline in question.” Students who wish to take English 105i can choose from the following subjects: Digital Humanities, Natural Sciences, Social Sciences, Humanities, Health Sciences, Business, and Law. Both English 105 and 105i share a “focus on identifying how genres, styles of writing, arguments, and forms of evidence differ across disciplines, audiences, and purposes.”

One of the writing and research skills taught in English 105 and 105i is how to “conduct research using a variety of academic databases and sources.” (UNC, n.d.).

Depending on the individual student’s experience, the first-year writing courses may be their first encounter using academic databases and online resources. It is

important to design online library resources with first-year writing students in mind, as their experience in these courses can affect their success at UNC.

Problem Statement

English 105 students rely on the UNC Libraries site to complete their course work. Even though all first-year and transfer undergraduate students are required to take this course, no research has been conducted on the usability of the UNC Libraries site in the context of English 105. By centering user experience and student-information interaction, this study addresses the question of how student success can be improved through usability testing and user interface design. The COVID-19 pandemic has drastically changed the nature of higher education, which has resulted in research becoming increasingly online and asynchronous. This poses unique challenges to first-year undergraduate students, who are no longer able to rely on in-person consultations with librarians when conducting research and completing assignments using library resources.

Objectives

The main objective of this study is to conduct user research to get insights that can make the UNC Libraries site more usable and more accessible for first-year undergraduate students. This study is informed by the usability research and library and information science (LIS) literature. Thus it exists at the intersection of technology and academia. This study examines the ways library website design affects the academic success of students with diverse abilities and educational attainment. It contributes to the LIS literature by providing a new perspective on user-centered website design for academic libraries.

Research Questions

The approach used in this study is that of usability research. Because usability research is such a well-established field, this study seeks to answer many of the questions that are commonly encountered when designing any user interface. However, it is different from most usability research because it takes place in an academic library setting. This study is guided by six research questions:

1. What are first-year students' course-related information needs?

2. Where do they go to seek course-related information?

3. How can we characterize first-year students' course-related information-seeking behaviors?

4. How do they interact with the UNC Libraries site and resources when seeking this information?

5. What are these UNC first-years' perceptions of course-related online library resources?

6. What are the accessibility implications of the website's design?

Literature Review

Identification of Literature

I identified literature using several methods outlined by Bates (1989): footnote chasing, citation searching, journal run, subject searches in abstracting and indexing services, and author searching. "Footnote chasing" refers to "following up footnotes found in books and articles of interest." (Bates, 412). Bates describes this technique as

being “extremely popular with researchers in the social sciences.” (412). “Citation searching” involves finding out who cites a given work and following the chain of citation. “Journal run” refers to identifying an important journal in a subject area and searching through its volumes. “Subject searches in abstracting and indexing services” is a method of finding that has become increasingly important since the advent of the Internet and involves searching for literature using academic databases. Finally, “author searching” refers to searching for authors known to work in a relevant subject area.

Bates’ conception of “searching as frequently being an evolving/berrypicking process” informed my method of identifying literature (Bates, 414). My search queries evolved considerably over the course of searching and my sources extended beyond the typical academic database search. However, due to the highly virtual and remote nature of my research process, I relied on online library resources almost exclusively, with the exception of journal websites and Google Scholar. The information I gathered cumulated in “bits and pieces instead of in one grand best retrieved set;” I often found my arguments evolving as I encountered more literature on usability design, which illustrates a real-world example of the iterative process of berrypicking (Bates, 421). As someone who has had access to the Internet for my entire life (my family were early adopters of technology in the 1990s), I used “a wide variety of search techniques which extend beyond those commonly associated with bibliographic databases” in my literature search (Bates, 421). My facility with search engines such as Google and my lifetime of practice navigating websites unconsciously informed my search process, leading to a highly organic and integrated literature search method. However, as is shown above, the techniques I used still conform to the methods outlined by Bates (1989). In addition to literature found by

searching, I rely on readings from my courses at SILS, especially INLS 582, Systems Analysis and INLS 718, User Interface Design.

Usability

There are many definitions of usability. Krug (2014) offers a wonderfully concise definition: “A person of average (or even below average) ability and experience can figure out how to use the thing to accomplish something without it being more trouble than it’s worth.” (9). In his book *Don’t Make Me Think, Revisited*, Krug outlines the ways in which designers can design systems that effortlessly meet users’ needs. Krug’s first “law” of usability is “Don’t make me think!” which “means that as far as is humanly possible, when I look at a Web page it should be self-evident” how to use it (11).

Krug (2014) claims that there is no such thing as an average user; “all web users are unique” and “all web use is basically idiosyncratic.” (108). Therefore, there is no one “right” answer to the question of what constitutes good website design. According to Krug, there is “only one way to answer that kind of question: testing.” (109). Regular usability testing is the best path to good design. Krug defines usability testing in opposition to focus group testing; “the main difference is that in usability tests, you watch people actually use things, instead of just listening to them talk about them.” (113).

Usability Research

Usability testing on online library resources was uncommon when Battleson, et al. conducted their research in 1999 at the University of Buffalo, but since this landmark study, academic libraries around the world have adopted usability testing as a way of making online resources better and more accessible. This study created a framework for

revealing a “great deal about the site without being terribly complicated or expensive.” (Battleson, et al. 2001).

In the contextual inquiry portion of their study, Battleson et al. tested the usability of the website as regards three tasks: (1) “Identify an item/title that is part of the Libraries’ collections,” (2) “Locate the most appropriate resource for finding journal articles on a topic,” and (3) “Find an appropriate starting point for research on a topic.” (Battleson, et al. 2001). The contextual inquiry was designed not to test students on their research skills, but to evaluate how students used the website to answer real-world problems and questions.

Battleson and her team found that even though the University of Buffalo had spent a lot of time and money on designing the library website, students still had difficulty using it. They found that in situations where “Online Resources” was the best option for completing a task, students still used “Library Catalog” first. They found that “there was obvious confusion with terminology as well as a clear misunderstanding of what the term “Online Resources” implied;” this is consistent with later research on the accessibility of library terminology (Battleson, et al. 2001). In general, this study revealed that students struggle with the usability of “online resource” sections of library websites; this is increasingly relevant today due to the highly online nature of education.

User Interface Design

Marcus (2002) defines “user interface” as “A computer-mediated means to facilitate communication between human beings or between a human being and an artifact.” (Marcus, 24). User interface design, or as Marcus argues it should be called, “user-interface development,” refers to the development of this computer-human interface.

However, Marcus in the same article warns us of the difficulty of defining user interface design, instead proposing a short lexicon of terms related to the field. Marcus brings user interface design into conversation with the alternative term “experience design,” highlighting that the latter is highly ambiguous.

Buchanan (2000) placed user interface design into context with the historical term “good design.” “Good design” goes back to Vitruvius, “who suggested that good design was ‘solidity, commodity and delight.’” (Buchanan, 1). Buchanan argues that “good design” today is radically different from in the past; today, “the designer’s stance is more intimately involved with human experience,” and designers today focus their “attention on performance as it is understood by the people who use products.” (Buchanan, 2).

Library UI Design

In a study at Rutgers University and Queens University Libraries, Jeng (2005) developed and evaluated methods for assessing the usability of academic digital libraries and discovered trends in “users’ criteria on ‘ease of use,’ ‘organization of information,’ ‘terminology and labeling,’ ‘visual attractiveness,’ and ‘mistake recovery,’” as well as common causes of breakdown for users (96). Jeng found that users’ criteria for ease of use were “‘easy to get around,’ ‘can follow directions easily,’ ‘easy navigation,’ ‘clear description,’ ‘intuitive,’ and ‘user-friendly;’” criteria for organization of information were “‘simple,’ ‘straightforward,’ ‘logical,’ ‘easy to look up things,’ and ‘placing common tasks upfront;’” those for terminology were “‘simple,’ ‘straightforward,’ ‘understandable,’ ‘generic,’ ‘label sections clearly,’ ‘no jargon,’ ‘clear descriptions/explanations,’ and ‘from user’s perspective;’” and those for attractiveness were “‘appropriate graphics,’ ‘readability,’ ‘appropriate color,’ ‘not too complicated,’

and ‘appropriate size of font.’” (108). Students evaluated “mistake recovery” in terms of having “easy navigation.” (109). “Site design, navigation, tasks, lacking of confidence, and mistake recovery” were identified as causes of user lostness. Jeng’s findings indicate that students generally want simplicity from library websites and want to find content with a minimum of effort. In addition, these findings show the importance of a site design that allows users to recover from mistakes caused by user inexperience.

Barker and Hoffman (2021) conducted a mixed-methods study at Kennesaw State University Library System to create a blueprint for creating LibGuides using a student-centered design process. The authors used a card sorting study and usability testing “to identify what content, aesthetic design, organization, and structure students preferred on a subject guide.” (75). In addition to the quantitative data collected from the card sorting and usability testing sessions, the authors collected student comments at the end of each session. They found that students ignored content toward the left of the page, and most students did not scroll past the center of the page, “often resulting in poor task completion for any task relying on content below the middle of the page.” (83). In general, students preferred a redesigned LibGuide “that had a single tabbed box with a tab for every resource type,” over the original design, “which had subsequent boxes for different source types.” (83). Despite concerns about the design of the LibGuides, students’ expectations of what they would find in a “research guide” usually lined up with what they found in the LibGuides, and they “very rarely suggested removing” any of the sections frequently missed during usability testing (83). According to the authors, “one of the most common student behaviors during usability testing was to immediately look for a search box to fulfill most of the assigned tasks,” and many students found the library’s

Find Sources page, “which contained a search box for the library’s discovery tool,” to be the most useful section of the page (84).

Barker and Hoffman also found that students “did not read large blocks of text.” (84). Therefore, any student-centered design for online library resources cannot be so text-heavy that students will not use it. The authors were able to get students to interact more successfully with LibGuides by rewriting the content to use short sentences and bulleted lists wherever possible (84). Interactive design was also shown to improve student engagement with content; “several students remarked that the simple act of clicking tabbed or gallery boxes made content more engaging.” (84). Students also appeared to care deeply about the design and aesthetics of the content; replacing images with ones “modified with filters and text to resemble popular social media graphics, such as those on Instagram,” led to positive comments from students (84). In general, students wanted easy-to-navigate, clearly-organized, subject-branded LibGuides that fulfilled their research needs without forcing them to read or search for answers.

Accessibility

Accessibility is a crucial part of usability. A design is not usable if it is not accessible. Lidwell, et al. (2010) define the principle of accessibility as follows: “designs should be usable by people of diverse abilities, without special adaptation or modification.” (16). Accessibility has four components, “perceptibility, operability, simplicity, and forgiveness.” (Lidwell, et al. 2010, 16). Perceptibility deals with accommodating users’ sensory abilities; operability deals with ensuring that everyone can

use a design, regardless of physical ability; simplicity means that anyone can easily use the design; forgiveness means that the consequences of user errors are minimized (16).

Accessible design historically focused on accommodating people with disabilities, but more recently, designers have realized that many "'accommodations' could be designed to benefit everyone." (Lidwell, et al. 2010, 16). This change of attitude is reflected in the most current methods and guidelines for accessible design.

Web content accessibility guidelines

In June 2018, the World Wide Web Consortium (W3C) released the Web Content Accessibility Guidelines 2.1 (WCAG 2.1). These guidelines cover ways content creators can make Web content "more accessible to a wider range of people with disabilities, including accommodations for blindness and low vision, deafness and hearing loss, limited movement, speech disabilities, photosensitivity, and combinations of these, and some accommodation for learning disabilities and cognitive limitations." These guidelines "are not able to address the needs of people with all types, degrees, and combinations of disability," but the W3C acknowledges that following them will "often improve usability for users in general," especially older people.

There are three levels of WCAG 2.1 compliance, A (the lowest), AA, and AAA (the highest). A website that does not meet WCAG Level A is not accessible. In the following section we will discuss the implications of the WCAG in an academic library setting.

Issues of accessibility in academic library websites

There is not much literature on the subject of accessibility in academic library websites. One study by Comeaux and Schmetzke on academic library websites in the United States found that between 2010-2012, sixty percent of the fifty-six websites surveyed complied with WCAG 1.0. However, a major limitation of Comeaux and Schmetzke's study is that the tool used for evaluating websites, "Bobby 3.1.1, is capable of detecting only a subset of accessible design principles," and is only able to detect compliance with WCAG 1.0, which were outdated by the time this study was conducted. In addition, Bobby ceased development in 2008 and was obsolete by the time of this study. The authors claim that they chose Bobby because they wanted to use "the same automated evaluation tool that had been employed in the previous rounds of data collection (2003 and 2006)," but Bobby's limitations made it useless for evaluating the websites studied for compliance with up-to-date accessibility guidelines. The authors recognized this issue, but still claimed that Bobby was useful: "Bobby may not cover some of the accessibility features that newer software can check, but what it does cover should be as relevant for accessibility today as it was ten years ago." It should be noted, however, that the WCAG are regularly updated to be more relevant to and inclusive of people with disabilities.

Another important study of the subject was conducted by Lisa Billingham in 2014 at Edith Cowan University (ECU). Initial testing of the ECU Library websites by consultants found that none of the sites tested passed WCAG 2.0 Level AA standards. Despite years of expensive and time-consuming usability research, the ECU Library

website failed both the initial test and the re-test conducted after the conclusion of the research.

Despite the apparent failure of the Billingham study, it gives insight into the issues researchers face when trying to implement accessible library systems. Billingham and her team ran into issues familiar to many librarians while doing their research, such as vendor non-compliance and the inefficiency of university bureaucracy. When Billingham reached out to vendors, she found that "the suppliers did not seem concerned at possible loss of business, legal action, or adverse publicity." Vendors simply did not appear to care about the quality or accessibility of their products. It was also difficult for Billingham to implement solutions to accessibility issues on the library website. ECU librarians were unable to implement changes to library websites without approval from higher levels of administration.

Billingham's study shows that even with usability testing, it is difficult to improve accessibility without the cooperation of librarians, vendors, and administration. Billingham points out that "A library needs web editing software, programs to test webpage accessibility and rectify any problems found by testing, and moderate in-house web skills in order to do accessibility testing properly."

Accessibility in this study

One of the greatest barriers to accessibility in library website design comes from the terminology used by librarians. In "Library Terms That Users Understand," John Kupersmith examined fifty-one library usability studies and found that "the average user success rate for finding journal articles or article databases is 52%." (1). Many of these studies cited terminology as a major contributor to usability issues. Kupersmith found

that library users generally struggle with terms such as database, library catalog, e-journals, index, interlibrary loan, periodical, serial, resource, reference, and subject headings – in other words, common terminology used by librarians to describe the kinds of things one might encounter in an academic library.

Student information behavior

The literature on student preferences for library terminology is consistent. Polger (2011) found that while "students and librarians use similar language to access the library catalog and databases," students prefer more natural language (15). For example, he found that students prefer terms containing "articles" over those that use "database." (16). Polger also argues that "many students may not have the time [or patience] to consult a glossary of library terminology, unless it is taught as part of the college's library instruction classes" (17). He claims that "many students want instant information and if they do not understand a definition, they may move on to something else or give up altogether." (17).

Fry and Rich (2011) conducted usability testing at Bowling Green State University to identify how students find and choose resources using library websites. They found that students generally stick to what they recognize; when asked to find sources for scholarly articles, students navigated "to known resources two-thirds of the time, whether that was a specific database, a specific journal, or a specific search engine." Students had no issue with finding specific databases and brands; in fact, "students were most successful navigating the library's database web pages when they were looking for the names of specific resources, not when they were browsing by subject." As a result of these findings, Fry and Rich recommend that "libraries should get specific in our promotions,

capitalizing on the brand recognition students already have and marketing brands that students will remember."

Fry and Rich also claim that students will do what they are told to do by instructors: "If a professor requires students to use a particular database, they will. Otherwise, they'll use what they know with Google as their backup." They found that "students generally understand the term 'database,'" which contradicts much previous research on the accessibility of library terminology. Both Polger (2011) and Kupersmith (2012) claim that students either do not understand the term "database" or prefer alternatives. However, Fry and Rich recognize that databases "seem to remain isolated in students' minds from other items in the library's collections," and state that "database A–Z lists, databases-by-subject lists, and full records for databases, remain an important part of the database discovery process for students."

Despite the importance of database-by-subject lists, students "did not, during the task completion part of the study, often successfully use them." (Fry and Rich, 2011). Such lists are often long and "and divided into categories that suit the library's collections rather than students' expectations." Students seemed to understand the kind of information they would find in alphabetical and by-subject database lists, but when it came to using them, they "did not scroll down and they obviously did not read them, which caused them at times to miss desired information." However, such lists are not without their uses. Fry and Rich conclude that "even if most students do not independently use subject lists of databases, they do help librarians assist patrons looking for resources in a subject area with which the librarian may not be very familiar."

Methods

This study was approved by the UNC IRB with the Study # 22-0194.

Sampling

This study used as its sample undergraduate students currently enrolled in English 105. This convenience sampling method was used because it gives a representative sample of the UNC first-year undergraduate population, as all UNC students are required to take English 105 or 105i. The study also used snowball sampling by asking contextual interview participants to ask classmates to complete the survey.

Survey

Most studies of academic library usability use contextual inquiry solely. However, this mixed-methods study used both a survey and contextual inquiry. The first part of this study surveyed UNC first-year students who were currently taking English 105: English Composition and Rhetoric. The survey was distributed by email to students. The purpose of the survey was to evaluate how first-year students feel about the usability of the UNC website. Students rated the usability of various aspects of the UNC Libraries site on a Likert scale on which 1 is “Strongly Disagree” and 5 is “Strongly Agree.” There were also multiple-choice questions.

Surveys are a quick and cost-effective method to collect data on usability and user perception of information systems. This study used Qualtrics to administer the survey to participants. The survey questions are based on the studies by Battleson, et al. (2001) and Fry and Rich (2011). The questions in the survey are detailed in Appendix A. Questions 1 and 2 were designed to gather information about participants’ demographics. Question 3 was designed to gather information related to RQ 2 and 3. Questions 4-6 was designed to gather information pertaining to RQ 3. Question 7-9 gathered information

about RQ 1 and 5. Participants rated Questions 4-10 using a Likert scale with 1 being "Strongly Disagree" and 5 being "Strongly Agree." At the end of the survey, participants were asked if they would be willing to participate in a 45-minute contextual interview session. Participants for the contextual interviews were chosen from the pool of students who stated that they were willing to take part in this phase of the study.

Contextual Inquiry

Participants were identified from the pool of students who completed the survey. It was planned to have five students participate, which is consistent with Nielsen and Landauer, who recommend about five test users for "discount usability engineering." (1993), but only two were able to participate. Those who participated in contextual inquiry sessions were rewarded with a $25 Amazon gift card paid for with a Carnegie Grant. Contextual inquiry sessions consisted of a contextual interview, in which I observed students interacting with the library website. The purpose of the contextual inquiry was to observe how students interact with the UNC Libraries website, not to assess their expertise in online research.

Contextual Interview

I followed the contextual interview process as outlined by Battleson, et al. (2001), with modifications made to allow students to participate remotely. Students were asked to complete several tasks with no help from the interviewer to identify how they interact with library resources and what breakdowns occur in the process. The design of the tasks was informed both by prior usability research on academic library websites and my own experience tutoring English 105 students at the UNC Academic Support Program for

Student Athletes. The contextual interviews were conducted over Zoom for both accessibility and so that transcripts could be obtained for building an affinity diagram.

The tasks in the contextual interview were not designed to test students' knowledge of library resources; instead, they were intended to gauge the usability of the UNC Libraries website in the context of English 105 and students' approach to conducting online research. In keeping with Battleson, et al. (2001), the tasks asked students to (1) see if an item is in the UNC Libraries collection, (2) identify appropriate resources for finding journals in a research area, and (3) identify an appropriate starting point for research. The tasks were directly based on the tasks posed by Battleson in her study. In addition, this study posed tasks that ask a fourth question: do students use resources outside the UNC Libraries site for academic research, and if so, which ones? The contextual interviews used a "think-aloud" protocol to assess how students interpret the site and the problems that come up. The contextual interview tasks are outlined in Appendix B along with the observation form.

Tasks 1 and 2 were designed to assess research questions 2, 3, and 4. Task 3 was designed to collect data for answering research questions 1-5. Tasks 4 and 5 were designed to assess the usefulness of the UNC Libraries site for finding specific articles and journals. These tasks were designed to evaluate the usability of the UNC Libraries site in the context of first-year writing classes, which require students to perform research at UNC Libraries to complete assignments.

The tasks for the contextual interview heavily leaned toward online research using online databases. This was in part a reaction to the increasingly online nature of research and education brought on by the COVID-19 pandemic.

Observation forms were created to record quotes and behavioral observations during the contextual interview sessions. The observation forms were broken down into sections, with a section for each task. Demographic data were collected on the observation forms before the start of each session. At the end of the observation form, there was a section for comments from the participants. A blank observation form can be found in Appendix B.

Data Analysis

A frequency distribution was created for participants' responses to the survey questions. Mean score, standard deviation, and variance were calculated for survey items rated using a Likert scale. Analysis of survey responses was done using Qualtrics and Microsoft Excel.

The observation forms were used to collect demographic data and analyze quotes from the participants. The final section of the observation form provided qualitative data about sentiment, which was used in analysis. The quotes were arranged into an affinity diagram to identify key takeaways from the contextual interview sessions.

As the contextual interview sessions were recorded, it was possible to time each participant's completion of each task. Both overall time and time per task were recorded. It was also possible to count clicks, as the participant shared their screen during the session. This information was collected in Excel.

Results

Survey Results

There were eight responses to the survey. Both first-year and transfer students were represented in the responses, with six first-years and two transfer students

responding to the survey. All respondents were cisgender females. The response rate was less than 5%.

Respondents were able to select all that apply from a list of seven research tools. The following table describes the results of Question 3.

Table 1. Responses to Question 3.

Research Tool	% users reporting use	# users reporting use
UNC Libraries Catalog Search	21.05%	4
UNC Libraries E-Research by Discipline	10.53%	2
UNC Libraries Articles+	21.05%	4
UNC Libraries eJournals	5.26%	1
WorldCat	0.00%	0
Google Scholar	15.79%	3
Google search	26.32%	5

For the Likert scale items, respondents were asked to rate six statements on a scale from 1 (Strongly Disagree) to 5 (Strongly Agree). See Appendix A for statement text.

Table 2. Responses to Likert scale items.

Statement	Minimum	Maximum	Mean	Std. Dev	Variance	Count

1	4	5	4.75	0.43	0.19	8
2	5	5	5	0	0	8
3	2	5	4.13	1.05	1.11	8
4	2	5	3.63	1.11	1.23	8
5	2	5	3.5	1.32	1.75	8
6	3	5	4.38	0.7	0.48	8

Contextual Interview Results

Due to the short recruitment timeline and low survey response rate, only two contextual interviews were conducted. Five students expressed interest in participating, but only two were able to do so within the research period.

Table 3 details the amount of time each participant took for each task, as well as averages. Average times are rounded to the nearest second.

Table 3: Time to Complete Tasks.

Task	Observation 1 (in minutes)	Observation 2 (in minutes)	Average Time
1	1:14	0:36	0:55
2	0:57	0:36	0:47
3	2:07	2:09	2:08
4	1:23	2:19	1:51
5	0:50	1:57	1:24

Table 4 outlines the number of clicks each participant made while completing each task, along with average number of clicks per task.

Table 4: Number of Clicks per Task

Task	Observation 1 (clicks)	Observation 2 (clicks)	Average Clicks
1	4	4	4
2	4	6	5
3	15	15	15
4	11	11	11
5	5	9	7

Both participants were familiar with Google Scholar but had not accessed it through the UNC Libraries site in the past. One participant searched Google for "UNC Google Scholar" and clicked on the first link that appeared, which allowed her to search Google Scholar. The other participant said "I assume there is [a way to access Google Scholar through the UNC website]" and accessed it by clicking on "Research Tools" on the main page and navigating to Google Scholar.

When completing task 2, finding a guide to research in economics, neither participant made use of E-Research by Discipline. One searched Google for "UNC Libraries Economics Guide," which did not return the desired result, and both used the subject research guides. Both expressed confusion about how to use the economics subject research guide.

Participants' search strategies varied widely when completing task 3, finding articles about North Carolina during the Great Depression. One participant used E-Research by Discipline to find a North Carolina history database; she was not satisfied with the results of this and instead used JSTOR, which she accessed through a Google search. The other participant used Articles+ and filtered the results to find relevant articles.

Both participants made heavy use of Ctrl+F to quickly search pages. Both participants made use of this function to complete task 4, which was to find the database Scopus. Participants also used Ctrl+F to search the E-Research by Discipline page and the subject research guides. Both expressed that they used Ctrl+F because the amount of information on the page was overwhelming.

For the last task, checking for access to the journal *Nature*, the participants made use of very different search strategies. One used the e-Journals page on the UNC Libraries site to search for *Nature* and found it immediately. The other searched Google for the journal, found the website, and logged in using "Access through your institution."

Discussion

The survey results indicate that most students feel that they are able to find the resources they need for their assignments. No respondent gave a response lower than "Somewhat agree" on this statement. However, students are more polarized about the usefulness and accessibility of the UNC Libraries site. While most respondents either somewhat or strongly agreed that the UNC Libraries site was the first place they went when looking for resources to complete their assignments and that they had a good idea of what course-related resources were available on the site, many indicated that they

somewhat disagreed with these statements, with 25% somewhat disagreeing with Statement 4 and 37.5% disagreeing with Statement 5. These results indicate that first-year and transfer students' opinions on the usability and accessibility of the UNC Libraries website vary, with most respondents indicating a slightly positive view of the site, albeit with frustrations about their ability to find course-related materials using the website and their knowledge about the various resources available.

Both interview participants indicated frustration with the UNC Libraries website when searching for specific databases, with one indicating that she was "overwhelmed" by the amount of information on the page. Even though Scopus was prominently displayed in the "Frequently Used" section of the E-Research by Discipline page, neither interview participant noticed it, opting to Google search "UNC Scopus." This illustrates an accessibility issue with the UNC Libraries website: the amount of information on the E-Research by Discipline and database list pages is so overwhelming that students do not feel that they are to find what they need. In the user experience design field, this issue is called "horror vacui," or "the desire to fill empty spaces with information or objects." (Lidwell et al., 128).

However, as we see, the contextual interview participants were able to successfully complete all tasks. This suggests that while students are technically *able* to access what they need through the UNC Libraries site, they do not like the site's design and find it frustrating. Future iterations of the UNC Libraries site should seek to bring it into alignment with the Universal Principles of Design as outlined by Lidwell et al., perhaps most importantly by avoiding a cluttered page layout. Neither contextual

interview participant took the entire 30 minutes to complete the tasks, further indicating that users are able to use the site if they must, even if they do not like its design.

The findings of both phases of the study show that the current system is usable but not enjoyable to use. The survey responses indicate that users are generally able to use the site to complete most tasks, though some respondents found that they "disagreed" with statements about their ability to find the necessary resources to complete course work. No respondent indicated "strong" disagreement with any statement. The contextual interviews confirmed that users can use the site to complete various course-related tasks. However, contextual interview participants consistently expressed frustration with the amount of information on the page or the general layout of the site.

A perspective academic library website designers need to take into account is that of design justice. This study intentionally included questions about gender in the survey to explore the ways in which "intersecting forms of oppression, including patriarchy, white supremacy, ableism, and capitalism, are constantly hard-coded into designed objects, platforms, and systems" – the system in question being library websites (Costanza-Chock, 2020). Future studies should seek to examine the ways in which race, gender, and disability affect users' ability to use academic library websites to complete their work, and how conscious design choices can be made to mitigate inequities in information access. This study was only able to reflect the perspective of cisgender female participants and was unable to ask questions about race or disability, as this was not the research question being studied. Academic library designers should consider including students from diverse backgrounds in the design process; in doing so, "there is a need to develop intersectional user stories, testing approaches, training data,

benchmarks, standards, validation processes, and impact assessments." (Costanza-Chock, 2020). Truly inclusive library website design is a task that goes far beyond a single graduate thesis project.

This study suffers from a low survey response rate and a low rate of participation in the contextual interview. This can be attributed to the late distribution of the survey – over halfway through the semester – and significant delays in the IRB approval process. Future studies of the usability and accessibility of academic library websites in the context of first-year writing courses should recruit participants at the beginning of the fall semester, which is when most students take such courses.

In conclusion, the results of this study indicate that the UNC Libraries site is technically *usable*, though the *perceived usability* and quality of user experience of the site is low. Potential remedies to users' dislike of the current website include increased user participation in the design process through regular usability testing, inclusive recruitment of contextual inquiry and survey participants, and an emphasis on accessibility and the Universal Principles of Design in future iterations of the website.

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Appendix A: Survey Questions

1. I am a (choose one):
    a. First-year student
    b. Transfer student
2. Please state your gender.
    a. Cisgender female
    b. Cisgender male
    c. Transgender female
    d. Transgender male
    e. Nonbinary
    f. Prefer not to answer
3. When I look for resources for my assignments, I use (select all that apply):
    a. UNC Libraries Catalog Search
    b. UNC Libraries E-Research by Discipline
    c. UNC Libraries Articles+
    d. UNC Libraries eJournals
    e. WorldCat
    f. Google Scholar
    g. Google search

4. I am able to find relevant materials for completing my assignments using the website.
5. I can find a book on the website if I know the title.
6. The UNC Libraries site allows me to find all the online resources I need to complete my assignments.
7. The UNC Libraries site is the first place I go when looking for course-related online resources.
8. I have a good sense of what course-related resources are available through the UNC Libraries site.
9. I can easily find resources that are useful for completing my assignments.

Appendix B: Observation Form and Contextual Interview Tasks

TO BE FILLED OUT BY RESEARCHER

Participant number:

Transfer/first-year:

Confirmation of Consent

The following will be read to the participants:

"The contextual inquiry is a session in which you walk through the process of completing tasks while "thinking aloud." The tasks you will be asked to complete involve finding information related to English 105 or 105i course work. There is no 'right answer' to the tasks; what's important is that you walk me through the process of completing the tasks. The contextual inquiry is expected to take about 30 minutes.

Your participation in the contextual inquiry is entirely voluntary and you may withdraw at any time.

The data collected from this interview will be anonymous. All identifying information relating to your participation in this study will be destroyed once you receive your compensation.

Do you still wish to continue?"

If the student answers "Yes," continue to the next section.

Tasks and Observations

1. Is there a way to access Google Scholar through the UNC Libraries site?
2. Does the UNC Libraries site have a guide to conducting research on economics

3. Assume you are doing a feeder assignment for ENG 105 where you have to find three articles about North Carolina in the Great Depression. How would you go about doing this? Use any site, including but not limited to UNC Libraries, to start your research.
4. Use the database Scopus to find an article about climate change. What would you need to do to access this article?
5. Does UNC provide access to the journal *Nature*?

Student's takeaways and comments

Appendix C: Funding Acknowledgement

Compensation for contextual interview participants was funded by a Carnegie Grant.