
This study sought to use web server log analysis and a clickmap software to discover how students use the English 101 course page made by the library’s Instruction Department at the University of North Carolina at Chapel Hill. The research found that actual use of the page is low, and the changes made from results of a usability study in the spring of 2008 are mixed. The minimization and short descriptions on the page seem to be effective, while the chat with a librarian widget and links go unused. The results suggest a closer look at the use of the pages is required, and further usability studies and surveys are necessary.

Headings:

Library Instructional Design

Website Evaluation

Use Statistics

Transaction Log Analysis

Academic Libraries

Undergraduates
A STUDY OF STUDENT USE OF A UNC CHAPEL HILL COURSEPAGE THROUGH WEB SERVER LOG STATISTICS AND CLICKMAP SOFTWARE.

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Introduction

On college and university campuses across the U.S., academic libraries are no longer solely defined by their physical buildings; instead, they are characterized by a network of outreach programs that have brought the library onto the Internet and into the classroom to better meet the needs and expectations of a generation of students that has grown up with the convenience of the Web. With the wide range of information resources available online, many students may not enter the physical library during their time on campus. As the students work through their classes, not only does the idea of visiting a reference librarian behind a desk never cross their minds, but the students often do not know where to turn to look for help or to broaden their resource use. This presents a challenge for librarians to find new ways to ensure that students have access to the services and resources they need to succeed in their academic careers.

As the main portal for these online-patrons, the library website seeks to strike a balance between the desire to have a site that is clean and well-organized and the desire to show patrons every resource that is available. Library websites are consistently redesigned in an effort to strike that perfect balance and continue to be attractive to users. The University of North Carolina at Chapel Hill Libraries (UNC Libraries) is no exception to this rule. Over the years the UNC Libraries has redesigned its entire website numerous times, using usability testing and focus groups in an attempt to meet the
changing needs of patrons. The work is ongoing, with the most recent redesign rolled out in the summer of 2008.

In addition to these periodic website redesigns, in 2007 UNC librarians turned to web-based course-specific research guides in an attempt to reach out to students. With today’s undergraduates more dependent on and comfortable with web-based resources than ever before, these online versions of traditional pathfinders are presented to students in a form with which they are familiar, leading to a higher probability of use. Students use the internet to locate information for class, as well as for their personal use, and they are often more comfortable with using the internet than the library for locating course-related information. In placing the information online, academic libraries seek to pull these students into the library, albeit the online library, and help guide them toward the resources they need.

Often academic libraries pair the online documentation with classes aimed to help students learn how to use the library resources for their assignments. Many of the early online-pathfinders were formed through collaboration between a librarian and a professor, and the results were presented to students during a library instruction session. Some of the online-pathfinders were for specific assignments, some for an entire class, and some targeted at an entire course. The online information was then accessible after the students left as a reminder of the resources they were exposed to during the instruction session.
Course Pages and Blackboard

In 2007, the UNC Libraries decided to take their online-pathfinders one step further and make them consistent and more readily available to students. Previously, each pathfinder was formatted differently and located in different places on the library website. To provide greater consistency, a template was created for the web pages that would help organize the information into sections. Known as a “course page,” each of these pages highlights the most relevant resources for the course and can include specific journals, books, databases, and websites. In addition, librarians have the option of linking to more general online tutorials and help pages for topics that might be relevant to the research assignment, like how to find a book or journal in the library or how to cite an article.

Each of these consistent and specialized research guides were registered with the UNC Libraries web team and linked off a course pages webpage that was a part of the main library website. However, this page was still buried in the library website. In an attempt to make the pages more visible and therefore more likely to be used by students, the UNC Libraries teamed up with Teaching and Learning Division of the University’s Information Technology Services (ITS Teaching and Learning) to integrate the course pages into Blackboard.

Blackboard is the course management system used by the University of North Carolina at Chapel Hill. It, like the move to online resources and instruction at the libraries, is a reaction to the new web-based technology available to colleges and universities and to the expectations and desires of Twenty-first Century students. Available constantly and from any location, the system allows professors and students to
utilize the web to turn classes into dynamic and virtual experiences. While some courses use Blackboard more than others, most students are familiar with the basic set up and use it on a regular basis.

Working together, staff from ITS Teaching and Learning and the UNC Libraries devised a system that would link each library course page to its corresponding Blackboard course site. For a number of years, the library had a default link to the library homepage on the Blackboard navigation sidebar. Under the new system, a library course page is developed and entered into a MySQL databases designed by the library systems department. That same library link in the Blackboard sidebar sends a query to the database with the course number and semester information. If the query returns a negative result, meaning that no course page has been made for this class, the student is taken directly to the library home page. If the query finds a matching course page, the student is taken to the custom library course page. This set-up allows the library to make as many specific course pages as it desires and no change to the Blackboard link or query set-up is needed. The link location to the course page is easy to find and even when not directed to the link, many students stumble upon it on their own.

Additionally, a course page can be made for large enrollment courses with more than one section. For example, the English 101 course typically has more than forty different sessions, each with its own Blackboard page. The current set up allows for the query to send the English 101 course number to the MySQL database and return the custom English 101 course page for each and every section of the course.
Utilizing the Blackboard Course Management System allows the library to be visible in the place students look for their course-related materials. It gives students a familiar location from which to access the library and information resources they need for their coursework.

**Assessment of UNC Course Pages**

Usability studies and surveys – both formal and informal – have found that online course-related instruction is used by students. At UNC, informal feedback from professors and students showed that the course pages are helpful and that they are being used; however the actual impact of the pages and their usability was not tested until the spring of 2008 (King, 2008). In her usability study, King utilized five tasks to determine if the course pages were more helpful than the library homepage for students.

King’s results showed that while the course pages were helpful for a specific course, there were some stumbling blocks and confusion points. King’s study led to the redesign of some of the course page template and to how the page links to other parts of the library webpage.

While King’s (2008) study assessed the usability of the course pages, it was still not known if the pages were being used. The omission was due, in part to the difficulties involved in tracking how often a webpage is actually used. Server logs can give you an idea of how often a page was accessed, but logs don’t tell whether the page was actually used, and if so how.

The UNC Libraries Systems Department runs a free-ware web log analyzer called Webalizer in an attempt to turn the server logs into something that is understandable and
useful. The Instruction Department has a specific section of the library webpage, including the course pages, pulled out of the general weblogs and analyzed in their own section of Webalizer. This allows them to get a general idea of how many hits are made on their pages as a whole, and which are the top ten or twenty pages requested.

While the weblogs and the usability tests are extremely important, they do not give the whole picture of use of a course page. This study seeks to fill that gap and was driven by a single, simple, research question: How are students actually using our course pages?

Through the use of web statistics, this study seeks to take the usability testing of a course page outside of the lab and into the real world. The study will provide evidence of the use of the course pages and whether changes implemented in response to King’s (2008) study were successful in facilitating use. In addition, the study seeks to provide the library with more data to help improve the course pages further to better serve the needs of the students.

**Literature Review**

**Twenty-first Century Students and the Library**

Studies have shown a significant difference in the thought processes and expectations of today’s students from those of twenty, or even ten years ago when it comes to accessing information. Twenty-first Century students have grown up with the Internet and believe that most information is quickly and easily available on the World Wide Web. When these students arrive on college campuses, they continue to rely on
what they know to be the best research tool - the Internet. The traditional library, once the center of students’ information universe, has been deemed irrelevant and pushed aside in favor of more familiar and convenient routes. (Barefoot, 2006; Oblinger & Oblinger, 2005).

One of the most significant factors behind this shift in attitude and perception is the Internet search engine Google. With its powerful, single box search engine it has become most students’ main information portal. Students have become so comfortable with this type of search they are easily baffled and often frustrated by library pages where, instead of a single search box, they encounter a myriad of different search tools and interfaces (Griffiths & Brophy, 2005). To further confound students, library websites are filled with library jargon, something that has plagued the field of library science for generations. It has become clear that if librarians are to meet the needs of generations X and Y, also known as the Millennial Generation, librarians will need to adjust their thinking and their approach to serving students’ information needs (Costello, Lenholt, & Stryker, 2004; Holliday & Li, 2004; Sheesley, 2002). A comprehensive change in library websites must occur; a powerful and simple search option must be presented and the appropriate metadata included in the records to make the search engine successful and students more willing to use the site (Augustine & Greene, 2002). Recent studies have found that millennial students are using the Internet more often than older generations, but that they are not always verifying the accuracy or questioning the credibility of the information they find online (Chen, 2001; Holliday & Li, 2004; Lombardo & Condic, 2001; Metzger, Flanagin & Zwarun, 2003). Many libraries acknowledge this situation and attempt to promote the use of vetted or more authoritative sources by placing subject
guides and course-related information online. This method of re-purposing the traditional paper research guide or “pathfinder” to match contemporary information-seeking behavior has met with some success. Usability studies of course pages have shown that when course pages and tutorials are organized in ways that make sense to students, they do help improve their success in doing research (Dewald, 1999; Hook, 2002; King, 2008; Ragains, 2001). Having a place to start helps relieve the anxiety students feel when beginning a research project, and when those sources come from professors and librarians, students are more successful in finding the information they need to complete their research projects (Head, 2007; Parker-Gibson, 2001).

In 2001, Veldof and Beavers studied students’ expectations and how librarians can and should take these expectations into account when developing library tutorials. The authors combined research from psychology, system design, and human-computer interaction to look at students’ mental models and how they affect the way students interact with, or expect to interact with, an online instruction page. Like Augustine and Greene (2002), Veldof and Beaver pointed out that the designers of course pages and the librarians who use them in their instruction, have very different expectations than the students who will use the page. They argue that instruction or course pages must be altered to better meet the needs and expectations of students (Veldof & Beavers, 2001).

Much of the literature in the field of information and library science (ILS) on online course pages surrounds the actual design of the page and its usability. Hook (2002) discussed why course pages should be constructed and how they appeal to many different types of learners in a student body. Ragains (2001) went into specific detail as to what
should be included in a course page and how it should be organized for best use. The author pointed out how course pages should be used as part of a larger program of library instruction that includes classroom sessions.

Unfortunately, most of the “how to” articles on course pages fail to take into account the students’ explicit information needs and system performance expectations, a necessity according to the literature on millennial students. In 2008, William Hemmig explored and critiqued the 1960s development of the pathfinder by Patricia Knapp. Hemmig found that Knapp’s work was fairly theoretically sound, except that she did not include the user in her formulation of the pathfinders. He continued his critique by paralleling Knapp’s work with today’s online course guides and argues for a more user-centered design in online guide development (Hemmig, 2005).

**Tracking the Use of a Library Website: Web Server Logs**

Libraries’ movement toward web-based instruction pages helps meet the needs of the students they serve; however, it provides a challenge to tracking library use. In fact, the widespread use of the web and all the changes that libraries have made in order to meet the needs of their patrons in this increasingly technological world, have changed how libraries count use of their services and resources. Circulation statistics and reference desk counts are no longer an accurate reflection of the number of students “using” the library. Since declines in usage statistics can have both financial and support implications, libraries have looked to web statistics to prove that they are still the information hub on campus (Welch, 2005).
Part of this void has been filled by mining the server logs on the web servers that hold the library’s website. An analysis of the logs that are automatically kept by servers can show general trends as well as specific situations. Everything from the time of day the website sees the most traffic to exactly what pages a specific user viewed during a session is recorded and can be analyzed to benefit the library. Since the advent of library websites, there have been a plethora of articles that discuss what exactly is found in the logs and how to analyze them to better serve library users. (Bauer, 2000; Breeding, 2005; Goddard, 2007; Tarr, 2001; Yun, et al., 2006).

In 1998, as many libraries were experimenting with their first websites, a movement emerged that pushed each library to collect their own statistics and then voluntarily deposit them into a collective database run by the ARL. It was argued that this would allow libraries to compare the use of their site to other similar libraries, thereby encouraging the sharing of ideas, designs, and best practices, which would result in better sites for all (Hightower, Sih, & Tilghman, 1998). While this plan never came to fruition, it did generate a significant interest in web server logs at an early point in web development. The study also showed that the correlation between webpage hits and webpage use was accepted from the beginning. This correlation was often taken for granted and server logs are analyzed by counting each hit on a particular page as a use of that page (Chatterjee & Jana, 2004; Heinrichs, et al., 2007).

Accepting the correlation between hits and use, analysts oversimplify the data server logs provide. Welch (2005) discussed the limitations and challenges to using server statistics in an article on the subject. Welch advocated for server statistics to be used as a measure of public service activity but also warned against taking the data at
face value. The author looked at web crawlers, unique visitors, and other technological and human interactions that can cause a web server’s logs to be “fuzzy at best.” (Welch, 2005, p. 374)

In his 2001 article “Lies, Damned Lies, and Web Logs,” Thomas Dowling made a similar plea to librarians to be honest about what the logs really say. While he promoted the use of web logs for statistics, he stressed that users should be aware of their shortcomings. He used the browser cache as one example of how a "hit" and a "view" are not always the same thing. He too used the word “fuzzier” in his description of web logs in his attempt to explain the situation (Dowling, 2001, p. 34).

Similar studies have come to the same conclusion that that while web logs are elements that should be included in any analysis, they alone cannot accurately assess how a website is truly used (Mariner, 2002; Tarr, 2001). All of these authors have also pointed out that the importance of combining web log analysis with other study methods, such as usability tests and user surveys, to provide a more well-rounded view of a website's use (Dowling, 2001; Nicholas, Huntington, Jamali, 2008; Mariner, 2002; Tarr, 2001; Welch, 2005).

A review of these and other articles on web server logs shows little in the way of pattern and change over time. Articles calling for more use of logs and extolling their benefits are mixed with warnings of their limitations. The literature reflects the ongoing debate over the significance of the web server logs, their accuracy and usefulness in studying the use of a website.
Methodology

In an effort to get a full picture of the use of a course page by students, this study chose to utilize both a traditional web analysis tool, and a visual tool called ClickMap. The combination of the two programs should give a more accurate idea of how often the course page is being used, as well as what parts of the page are being used.

The traditional web analysis tool, Webalizer, which is used by the UNC Libraries Systems Department, was an obvious choice to use for analysis of the course page. The system was already in place on the web server, and the Systems Department staff members were willing to provide access to it.

A web server access log is a list of all the requests for files that people have sent to a website. Each request is logged in a separate line and records information about the request and the person requesting it. Generally, logs show

- The IP address of the client requesting the information
- The date and time of the request
- What is requested
- A code that represents whether the request was filled or not (and if not what went wrong)
- The amount of data sent to the requester
- The referring page (what page the requester came from to get here)
- The user agent, which is usually the type and version of the browser used to request the page

This information can then be statistically separated and compiled, either by hand or with the use of a program.

Webalizer is a fast, free web server log file analysis program that generally comes packaged with web servers. It produces highly detailed, easily configurable usage reports in HTML format, for viewing with a standard web browser. The program is a simple, out of the box solution for analyzing weblogs with very little effort, and the results are
formatted in a way that makes sense to people who aren't "techy" or involved in the processing of weblogs.

For this study, the choice was made to search the Library’s daily weblogs for the chosen course page, and then move those specific log copies to a separate location. This would give more options of data manipulation without the chance of interrupting the library’s normal web analysis routine. The search statement was made into a batch file that ran each night, which automated the transfer process. With this set-up, the entire semester of weblogs for a course page could be saved in one location and later analyzed either in sections or as a whole. The logs take up relatively little space, so storage was not an issue.

**ClickMap**

ClickMap is a mix of an open source software that is downloadable and can be locally modified. It uses a combination of javascript and ruby to record each individual “mouse-down” click on a website. It overlays a grid and records the x and y coordinates for each click, and stores the information in a file. Once the clicks are collected, a script is run that compiles all the clicks and turns them into an image that overlays the page and shows where people have clicked.

The program produces an image that looks similar to a thermal image. This type of graphical representation of data turns the values taken by a variable in a two-dimensional map and represents the data as colors. Individual clicks are represented as white hot in the center and dulling out to blue at the edges. When lots of clicks are
mapped together, this allows the most used areas to have the white hot center, and fade out as clicks become fewer.

This can be cause for some confusion. On a page with two clicks, each click looks like a bulls-eye with a white hot center; but on a page with hundreds of clicks, a single click might only show up as light blue. The program takes into account the total number of clicks, and prepares the image and colors relative to the total numbers. If this was not done, each individual click would show as a bulls-eye, and on a page with hundreds of clicks this could get very confusing.
The program shows how users are using the page. It could be considered an unobtrusive form of usability testing. You can see what people are choosing to use and what they are not choosing to use on the page. It helps identify design problems, such as areas people assume are clickable links, when they really are not. It takes testing outside of a lab and into the real world.

The Web Team at the UNC Libraries began using the ClickMap software as a part of the library webpage redesign during the summer of 2008. The head of the Web Team altered the open source product to fit the needs of the library. While already installed and ready to use, the program was still in the testing stage, and all the kinks and special issues had yet to be worked out. This led to several test runs of the program before implementation for this study; and the results and trials from this study helped tweak the program for future use.

Due to the testing of the ClickMap product, researchers were not sure how large the logs containing the necessary information would be. Also unknown was whether the product would run simultaneously on more than one page. Because of these issues, particular dates were chosen to run the software. The test was run, first one week, followed by another. After two trials of a week with no problems, the test was run for two weeks straight at a later point in the semester.

**English 101 at UNC Chapel Hill**

Course pages are typically designed for a specific course, which can range in the number of sections and students enrolled. Without a relatively high number of hits on the page, the data cannot be generalized or studied to any effective degree. To ensure enough
data could be collected and analyzed, the decision was made to choose a course with multiple sections and high enrollment. The course pages constructed for two required English Composition courses, ENGL101 and ENGL102 were obvious candidates because of the high number of sections and enrollment. In addition, both courses have a high probability of at least one library instruction session where the course pages are introduced.

The English Composition Program at UNC Chapel Hill is designed to prepare students for writing at a collegiate level and is required for all undergraduate students, unless they score high enough on their college placement exams (SAT) to be exempted. The program consists of three different sections – English 100, 101, and 102. The majority of students place into English 101 and take the course in the fall of their first year. These students will take English 102 in the following spring semester. English 101 focuses on different types of language and writing used in popular culture, public issues, and professional communities; English 102 focuses on academic writing in the sciences, humanities, social sciences, and business.

As data collection was to take place during the fall of 2008, the English 101 course page was chosen for this study. During that semester, there were 46 sections of English 101 taught, not counting the 4 sections that were canceled. A total of 39 teaching fellows (TF) taught the 46 classes, with 7 TFs teaching two classes.

The English 101 courses are capped at 19 students, and can have as few as 6. Of the 46 sections in the fall of 2008, 29 of the sections were closed, meaning they had 19 students in them. The other 17 courses could have had as few as 6 or as many as 18; therefore the English 101 courses in the semester had somewhere between 653 and 857
students. The new student enrollment for fall of 2008 was 4,035 students, meaning that between 16% and 21% of the new students were enrolled in English 101 during the semester.

For the purpose of this study, it was not important to know exactly how many students were in the program or how many attended a library session. Of note, was the fact that the number represented more than 15% of the first-year class, leading to a significant number of students who are linked into the English 101 course page through their Blackboard site.

![English 101 Classes, Fall 2008](image)

**English 101 Course Page**

After the English 101 course page was chosen, decisions concerning what parts of the page needed to be monitored had to be made. Since the page is made for a large course that has a variety of individual sections and assignments, the course page is
actually a combination of 5 pages linked together, all using the same course page template.

The template is a three column layout, with the main information in the center. The left column has contact information for librarians, as well as the new chat widget in which the patron can chat to a librarian on campus without leaving the course page or having to download any chat software. The right column has links to the other parts of the course page, as well as links to general library tutorials that could help the students.

The two side columns are very similar on all five of the pages.
students in that area, as well as other information to help steer them in the right direction. There is also a general research page that steps students through the research process, from finding keywords to citing articles and books.

**Webalizer**

The decision was made to track usage of all five of the pages involved in the course page, and the Webalizer software was set up with the batch file moving copies of logs pertaining to all parts of the course page. These logs were continually copied to the separate server. At the end of the semester the entire log folder was duplicated. This meant that two separate instances of the Webalizer software could be run. Since the software and the results can be customized, including the ability to exclude instances of webcrawlers and bots, the researcher was able to adjust the settings to get a variety of results for comparison and greater understanding.

The program has the built in ability to ignore requests for any type of file or requests from any particular location. This allows the researcher to cancel out requests for image files or style sheets. In addition to ignoring webcrawlers and bots, the program will also allow the ignoring of any views of the page by the researcher during the semester. This gives one the ability to rule out all the excess requests and views of the course page and reveal only the actual use of the page, which can then be studied.

**ClickMap**

The ClickMap software could not be run for the entire semester so the decision had to be made as to when to run it. To determine which times during the semester the
course page would likely have the most use, an analysis of library instruction classes for English 101 from the fall of 2007 was made. The researcher found that classes usually attended library sessions a week to two weeks before the unit assignment was due. By looking at the dates when most library instruction classes were concentrated, the researcher was able to estimate when assignments would likely be due, and therefore students were most likely to use the course page.

The analysis of the fall 2007 data was made by noting each English 101 library instruction session. The dates of the sessions were plotted and grouped by weeks; a week was defined as Sunday through Saturday. These weeks were then numbered according to the fall 2007 semester. The analysis showed three peak times of library instruction periods: week 2, week 7, and week 12 of the semester. These were set as the tentative dates to run the ClickMap software.
Once the requests were entered for fall of 2008, the dates were shuffled to reflect the Fall 2008 data; however, there were some last minute requests, which means that one of the peak weeks of instruction classes was missed in the software. The decision was made to run the software from mid-week to mid-week, instead of Monday to Sunday. This reflected the fact that most students were expected to work on projects over weekends, especially Sundays. This also allowed the software to be turned off and on during the business week, so that if problems occurred, members of the Library’s Systems Department would be available to assist with troubleshooting.

After the first week-long run of the software produced a small log file and relatively few clicks, the decision was made to let the software run for two weeks during the second run. Again, the results were small, but successful. For the final run, it was decided that the software could run for three weeks to capture the last big group of instruction sessions and assignments that were due leading up to the Thanksgiving break.
Findings

During the course of the fall 2008 semester, the five page English 101 course page had a total of 19,974 hits, including all of the visiting web crawlers and image requests for the pages. The main portal page was visited the most often, and mainly through direct request. This means that users were either directly entering the path into their web browser, had the page bookmarked, or were coming in through the “Library” link in their Blackboard site.
The course page was used most often Monday through Friday, with significant decreases in use on weekends (especially Saturdays) and over school holidays (such as fall break and Thanksgiving). Monday, Tuesday, and Thursday had the most hits, but the most active days varied greatly from week to week. Use of the page by hour peaked around mid-day, with an additional peak in the evenings. Use of the course page between the hours of midnight and eight am was extremely low.
Of the total hits, 8,499 occurred during the 44 days that the ClickMap software was running on the course page. This is approximately 42.5% of total hits on the course page for the entire semester, and we only ran the ClickMap software 32.8% of the days. This implies that basing the days to run the ClickMap software on the instruction classes was a good choice, as we captured a relatively high percentage of total use.

**Clickmap Findings**

Since the ClickMap software was run for different lengths of time during each run, direct comparisons were not easy to make. For instance, during the eight days the ClickMap was running during the Unit 1 instruction period, only nine clicks were recorded on the corresponding Unit 1 course page, while the Unit 3 course page recorded approximately forty clicks during the twenty-one days the software was running during Unit 3 instruction period. Whether this means that students were using the Unit 3 course
page more often than they were the Unit 1 course page, or whether the ClickMap software was not timed to correctly capture the frequency of use is impossible to know.

![ClickMap Image of Unit 1 during the first run](image1.png) ![ClickMap Image of Unit 3 during the third Run](image2.png)

Even determining exactly what parts of the page the users were clicking on has its difficulties. The overlay that the ClickMap software places on the page does not take into account screen size, and the course page is designed on percentage sizes, so it will expand and contract to fit a user’s screen. This means that on a small computer screen with an 800x600 pixel image setting that the “chat with a librarian” widget is at a different spot on the x/y pixel axel that the ClickMap overlays the page with than the same spot is on a 1280x800 pixel laptop screen.

![Comparison of pixel location of a particular point on two views of the same webpage.](image3.png)

While the horizontal position of the click cannot be accurately established due to these different screen sizes, the vertical position is more accurate. The course pages are designed to expand and contract horizontally, but have very little vertical alterations.
Since the vertical position is fairly accurate, the horizontal positions are easier to judge by looking at the vertical position and where links on the course page are located.

Another detail that makes it easier to judge exact positions of the recorded clicks is that there seems to be a habit of accidentally clicking on the screen when trying to move the scroll bar on the right side of a user’s screen. This leaves a trail of clicks where the scroll bar of a screen was positioned. If one brings up the ClickMap image, a screen can be resized to meet the different scroll bar lines, leading to a fairly accurate reading of where the clicks were actually made.

Examples of accidental clicks around a vertical scroll bar

After taking into account all these issues, an assessment of what parts of the course page are being used can be formulated. To begin, only fifteen clicks were recorded in the entire forty-four days of run time on the “Beginning your Research” page. Use of the individual unit pages was low when the unit was not being taught. For instance, during the third running period of the software, unit 3 was the main focus of the instruction classes. These twenty-one days showed one click on the Unit 1 course page, no clicks on the Unit 2 course page, and close to fifty clicks on the Unit 3 course page.
This is also an indication that students understand the navigation and divisions between the three units in relation to their information needs.

For each unit page, the most used areas were links to specific databases or to the E-research tools links, links to related online library tutorials, and navigational links to places within the course page or to the main library home page. Despite the accidental clicks around the scroll bar, few clicks were made below what would show up on a user’s screen (known as “below the fold”), re-enforcing the idea used in the design of the course page that the important links needed to be “above the fold.”
The left side bar of all three unit pages got no attention from users at all. The link to email a librarian for help and the chat with a librarian widget did not have a single click recorded on them on any of the unit pages during the entire forty-four days the ClickMap software was run.

Data on the introduction page is more plentiful, since it had the most hits of all five parts of the course page. Again, navigational links with in the course page, as well as to the main library home page were frequented across all three times the ClickMap software was run. Other frequently used links were the center focus sections to the different tutorials and “how do I” information tutorials on the library website.
Introduction page from run 1 of the software. Notice the concentration of clicks in the “How Do I...?” Section, as well as in the tutorials and the navigation.

Introduction Page from run 3 of the software. Note the concentration of clicks around the navigation, as well as the tutorials.
On the main page, there are two places where a user can choose to chat with a librarian, the widget on the left column, and the badge in the top center column. Due to the horizontal location issues mentioned above, exact use of the two chat links cannot be established; however, a general idea can be formed about use. There are only two clicks, one in during the first run and one during the third run, that could be linked to the “pop out” link on the chat widget, and 5 or 6 that might be connected to the chat badge link. Clicks on the chat badge link are harder to make conclusions about since resizing the screen also makes those clicks line up over the inter-course page navigational links.

These clicks could be either on the “chat with a librarian” badge or the inter-coursepage navigational links. It all depends on what size the user’s screen was when they clicked.

There are also multiple clicks on the three introduction images that do not line up with anything no matter how you re-size the screen. These are most likely random clicks as users read the page or accidently hit their mouse while moving around the screen. There is a chance that they could be due to views on pdas or hand-held computers; however, this chance is very small and fairly unlikely as the page as viewed on a pda is cumbersome and difficult to use.
Webalizer Findings

While data from the short runs of the ClickMap software does not have many solid findings, the Webalizer data for the entire semester has enough data to make solid conclusions. As discussed earlier, a total of 19,974 hits were made on the 5 part course page over the course of the semester. This raw data shows the complete web use of the course pages, but it does not show actual use of the pages by students. The data includes webcrawlers, requests for the css page and images, page tweaks made by staff members, all the visits made by researchers during the data gathering stages, and the requests for the java script overlay for the ClickMap software. Removal of this data from web server logs is often viewed as lying, or twisting the statistics; however, since the focus of this study is on actual use of the course page by students, removal of the random data and webcrawlers helps to boil down the information to what is appropriate.

Through the use of the program’s configuration file, we were able to ignore, or completely rule out, the following requests for files that count as a hit but are actually used to properly display the page: cascading style sheets (css), references to the ClickMap software, and images. Additionally, we chose to ignore the main three webcrawlers that were seen to be hitting the site: Google, Yahoo, and the UNC Search crawler. While the instances of users finding the course page through these search engines is important, the appearance of the crawlers does not reflect a use by students. Ignoring the webcrawlers does not ignore hits to the page that are found through the search engines.
<table>
<thead>
<tr>
<th>Type of File</th>
<th>Syntax used to ignore it</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSS Files</td>
<td>*.css</td>
</tr>
<tr>
<td>ClickMap references</td>
<td>*showHeat=true</td>
</tr>
<tr>
<td>Misspelled ClickMap references</td>
<td>*showHeat=ture</td>
</tr>
<tr>
<td>Java Script Files (ClickMap related)</td>
<td>*.js</td>
</tr>
<tr>
<td>Images</td>
<td>*.gif</td>
</tr>
<tr>
<td></td>
<td>*.GIF</td>
</tr>
<tr>
<td></td>
<td>*.jpg</td>
</tr>
<tr>
<td></td>
<td>*.JPG</td>
</tr>
<tr>
<td></td>
<td>*.png</td>
</tr>
<tr>
<td></td>
<td>*.ico</td>
</tr>
</tbody>
</table>

The researcher also chose to ignore the static Internet Protocol (IP) addresses from the two main computers used by researchers during the data collection phase. Since there was some running and tweaking of the ClickMap software during the semester, there were days where the majority of hits on the course page were from researcher trying to figure out what was wrong. Since these hits were not related to actual student use of the page, and the only user of a particular computer was a researcher, two IP addresses were ignored completely.

After these items were ignored, the number hits on the course page during the semester dropped from 19,974 to 3,397 hits. This number more accurately reflects the use of the course page by students during the semester. Even though the number is significantly smaller than the total number of hits on the page, the use of the page by month, day, and hour is basically the same percentage points with either set of data.
Use of the reduced data set shows that the use of the course page peaked during the months of September and October, in the heart of the semester. Hits on the weekends, especially Saturdays, dropped - just as in the total hits; however, the drop was not as significant as it was in the total count. This difference could be because webcrawlers and bots work only during the week. The pages still had few to no hits during the fall and Thanksgiving breaks. As mentioned before, use of the page was highest during the middle of the day and then again in the evenings.
Most users entered the course page through the main page, and it was most often a direct referral. Other than direct referrals to the site, users came in through eight other paths.

Web Server Logs always record the IP address of the user, and these IP addresses can be traced back to their users. With the Webalizer program automatically set to trace
the IP addresses and apply names to them if possible, the list of different users of the
course page topped four hundred in September and October. Just as it is possible to
ignore the researcher’s computer IPs, the Webalizer program also allows the grouping of
DNS names or IP addresses. Patterns were observed in the users list, and groups were
formed to collect similar types of IP addresses together.

<table>
<thead>
<tr>
<th>Type of Group</th>
<th>Group Names</th>
<th>Syntax used to group all related IP addresses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campus ITS DHCP: used in all dorm rooms for student’s computers, as well as for many computers in classroom buildings</td>
<td>Granville DHCP</td>
<td>*-granville.unc.edu</td>
</tr>
<tr>
<td></td>
<td>New South DHCP</td>
<td>*-newsouth-resnet.unc.edu</td>
</tr>
<tr>
<td></td>
<td>High South DHCP</td>
<td>*-highsouth-resnet.unc.edu</td>
</tr>
<tr>
<td></td>
<td>Mid-resnet DHCP</td>
<td>*mid-resnet.unc.edu</td>
</tr>
<tr>
<td></td>
<td>North-resnet DHCP</td>
<td>*north-resnet.unc.edu</td>
</tr>
<tr>
<td></td>
<td>Classrooms</td>
<td>*.dhcp.unc.edu</td>
</tr>
<tr>
<td>Wireless on UNC Campus</td>
<td>UNC Wireless</td>
<td>*.wireless.unc.edu</td>
</tr>
<tr>
<td>ITS Computer Labs</td>
<td>ITS Labs</td>
<td>*itslabs.unc.edu</td>
</tr>
<tr>
<td>Public Computers in the Library (includes classroom computers)</td>
<td>Davis Library Reference Staff Computers</td>
<td>aalref*</td>
</tr>
<tr>
<td></td>
<td>Undergraduate Library Staff Computers</td>
<td>aalul*</td>
</tr>
<tr>
<td></td>
<td>Library Staff Computers</td>
<td>aaladm*</td>
</tr>
<tr>
<td>Library Staff Computers</td>
<td>Undergraduate Library Public Computers</td>
<td>aalhulp*</td>
</tr>
<tr>
<td></td>
<td>Davis Library Public Computers</td>
<td>aaldavpub*</td>
</tr>
<tr>
<td></td>
<td>Davis Library Classroom Computers</td>
<td>aalclass*</td>
</tr>
<tr>
<td>VPN Connections – due to server restrictions, most library staff have to use the VPN client when working from home to access servers and shared drives</td>
<td>VPN</td>
<td>*vpn.unc.edu</td>
</tr>
</tbody>
</table>
After grouping, it was discovered that the top users of the site were coming from the library – both public computers and classroom computers, the campus wireless, and the Campus DHCP servers, the servers that connect all the UNC dorm computers. Other high groups were the library staff computers and an IP address coming from the computer science department at the technical university of Aachen in Germany. Other users were scattered through local high speed internet connections, other campus computer labs, and a few other libraries across the country.
User’s browser choice was fairly overwhelmingly Mozilla’s Firefox 5.0. The next choice of browser was Microsoft’s Internet explorer. This information is important to know when designing web pages as each browser renders, or shows, a webpage slightly differently. Since the Webalizer only reports browsers that are self-identified, the numbers shown in the graph below are slightly off.

Discussion

These findings show that the majority of actual use of the course page is by students at UNC-Chapel Hill, yet use is still fairly low. If the maximum number of students possibly in the English 101 program in the fall of 2008 was 857, then there were approximately four hits per student on the course page. We know that not all of the hits...
were from the university, but even if they were, this is still extremely low when the course page is made to help these students through all three of the units in the course.

Not only are students not using the course page often, they are not using all the parts of the page. The ClickMap software shows that the chat with a librarian options are rarely to never used and the specific unit pages are not utilized as often as the main introduction to the course page. If librarians and graduate students are spending hours working on these course pages and teaching the instruction classes, why are the pages not being used?

The users do follow the links to specific databases and online tutorials that are linked from the main page and the unit pages of the course page. These links have descriptive titles or additional descriptions with them that help guide a user in making a choice about following the links. If the users are students, then they may recognize the title as something their instructor referred them to or the descriptions may resonate with them as somehow useful to their research.

The usability test performed in the spring of 2008 led to changes in linkage between the course pages and the way resources were described and placed on the page. These changes were informed by students’ complaints and use of the pages during a lab-based usability test. Without a follow up study, we cannot know if the changes are what the students were seeking; however, the frequent use of the links to sources and tutorials with good descriptions by users in this study show that the changes most likely had a limited impact on the overall use of the pages.

Despite general conclusions gained from the ClickMap software, the problems associated with the product made it less useful than was expected. Pairing the results of
the software with the Webalizer data did provide sufficient data to draw some general conclusions on how the course page was used.

**Conclusions:**

This study sought to discover how students use the English 101 course page made by the library’s Instruction Department at the University of North Carolina at Chapel Hill. The research found that actual use of the page is low, and the changes made from results of a usability study in the spring of 2008 are mixed. The minimization and short descriptions on the page seem to be effective, while the chat with a librarian widget and links go unused. Without pairing a survey or traditional usability study with these results, we cannot know if the students found what they were seeking or if altering the page would improve use.

These findings are limited in that the ClickMap software was only run for a total of forty-four days during the semester, and the software was still in experimental stages. To receive better results and have data that will more accurately reflect the use of the course page, the ClickMap software should be run for an entire semester. The comparison of those results with the Webalizer data could potentially provide a more accurate picture of actual website use.

With the knowledge that the English 101 course page is not being used as often as the library expected, steps need to be taken to determine if this is the case with all course pages, or just this particular page that is more general than most to meet the needs of a
large group of students. A similar study of a course page made for a specific class would be a good comparison study.

Suggestions for immediate implementation include increasing the advertising of the English 101 course page to students and professors and suggesting new ways to teach the instruction classes that include this course page. Additional resources could be added to the unit pages to help the students without making them too crowded, but care needs to be taken in making sure that the descriptions of the resources is as specific as the current descriptions.

A close look needs to be taken at the course pages as a whole, to make sure they are meeting the needs of the students and are actually being used. Hours upon hours are spent in the creation and perfection of the pages, but if they are not being used by the students, their existence should be questioned. Other options for web-based instruction should be explored, as a lack of web presence for library instruction is unacceptable in the current environment. We do need to meet students in their location of choice, the web, or we may lose touch with them all together.
Appendix 1

English 101 Course Page – Home Page

<table>
<thead>
<tr>
<th>Ask us</th>
<th>Welcome</th>
<th>Unit Pages</th>
</tr>
</thead>
</table>
| Reference Desk:  
  Monday-Thursday: 8 am - 10 pm  
  Friday: 8 am - 4 pm  
  Saturday: closed  
  Sunday: 1 pm - 10 pm  
  Phone: (919) 681-1661  
  Email: libref@unc.edu  
  Chat with a Librarian  |
| During English 101, you will probably visit UNC-Chapel Hill Library with your class. On your visit, you will learn how to use the Library's resources for your own research. These pages are intended to help you find specific information quickly. If you have a question, you can always ask a Librarian!  
  Tutorials  
  How to Library Research: Your professor may require you to read through this tutorial and complete the quiz at the end.  
  Using Information  
  Evaluating Information  
  Information Sources  
  New Subject Modules...  |
| Getting Started...  
  Beginning Your Research  
  Campus Resources  
  Writing Center  
  ITS Labs  |
| Plagiarism & the Honor System  
  What is Plagiarism?  
  UNC Honor System  |

Need help? Ask a Librarian  
Suggest a new Library Service? Give us your feedback  
URL: http://www.lib.unc.edu/encyclopedia/zip101/English101.html  
This page was last updated Tuesday, November 10, 2009.
## English 101: Unit 3

### Ask us

- **Reference Desk:**
  - Monday-Thursday: 9 am - 10 pm
  - Friday: 9 am - 4 pm
  - Saturday: closed
  - Sunday: 1 pm - 10 pm
- **Phone:** (919) 662-2000

### Chat with a Librarian

- **undergradref**

### Articles from Professional Discourse Communities

- **Looking for articles written for older people in a particular profession?**
  1. Start at the Library E-Research Tools page.
  2. Go to the subject drop-down menu.
  3. Select the subject course terminology.
  4. Click Search.

- **Start with the recommended databases in the top row:**
  - Click the orange "Try!" link next to the database title to learn more about it.
  - You may also find the "Guided" tab helpful. They list the best resources for researching particular topics within each subject area.

### Open Access Academic Journals

- **DOAJ Directory of Open Access Journals**

  - **For Articles:**
    1. Click on "Find Articles" on the left sidebar.
    2. Enter keywords in your search.
    3. Click "Search".

  - **For Journals:**
    - Click "Find Journals".
    - Search in a specific journal.
    - Browse journal by title.
    - Browse journal by subject.

  - **Note:** Many of these journals are of high quality. If you’re unsure about the quality of a particular journal, select the "Find" link to ask your instructor or a librarian for help.

### Unit Pages

- **Academic versus Professional Publications**
  - "How Do I Distinguish Different Types of Sources?"

- **Literature Reviews**
  - Need help to conduct a literature review? Visit the Library’s literature review page for help.

- **Citing**
  - **Citing Information Tutorial**

- **Plagiarism & the Honor System**
  - What Is Plagiarism?

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**Helpful Resources:**
- Library E-Research Tools
- Library’s literature review page
- Citing Information Tutorial
- What Is Plagiarism?

**FAQ:**
- Need Help? Ask a Librarian
- Suggestions on Library Services? Give us your feedback.

**Website:** [http://www.lib.unc.edu/englishteachers/e-gov/EngLit101/unit3.html](http://www.lib.unc.edu/englishteachers/e-gov/EngLit101/unit3.html)

**Update:** This page was last updated Thursday, November 1, 2009.
Step 1: Think, Gather, Define

Think

• Identify ideas that are important to you
• Identify topics that have been in the news recently
• Identify issues people talk or argue about

Can't think of a topic? Browse the databases below for ideas...

• CBC Researcher: Current, controversial topics
• Issues & Controversies: More current, controversial topics
• TDS: Society on File: Current research and scholarship in the sciences

Gather

The databases above are a good place to look because they deal with current issues/ topics.

Define Your Topic:

• Pick a side (if you are presenting a persuasive report, an essay, it is important to pick one side of an issue)
• Choose a subtopic (e.g. abstract of immigration might be illegal immigration, immigration law, or immigration tax)
• Narrow by Geographical Region—subjects involved in immigration, but only in the U.S. or Math Canada

Step 2: Creating Keywords

It is important to transform the keywords before you start searching. You will decide your search settings from these keywords. In a sense, starting generating keywords, that is, what are you already know...

What do you already know about your topic?
What do you think you might find about your topic?
What are your ideas about your topic?
What are other ways to think about your topic?

When transforming keywords, it is important to think about your topic in many ways:

• Synonyms
• Other spellings
• Other name's of the word
• Other ways to think about your topic
• Other places to search for your topic
• Variations of your topic
• Major categories in which your topic
• Geographic region in which you are interested

Step 3: Start Searching...

For Arthur: Go to E Research Toolkit and select a subject from the Subject pull down menu.
For Becca: Start the Catalog

Research Consultation | Reference | E-Books | Tutorials
Library Home | News | UNC Home
References


