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Article begins on next page

Using Google Analytics for Improving Library Website Content and Design: A Case Study

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Introduction

As more and more digital content goes online, libraries today are fundamentally different than they were as recently as five years ago. Websites have become an essential component of library service, and designing these websites involves both technical and administrative decision-making. During the past five years, the Rutgers-Newark Law Library (RNLL) has used different methods to figure out exactly what our visitors are looking for on our [website](#). Recently, we used [Google Analytics](#) to track our visitors' behaviors, and pinpointed the motivations behind their information-seeking. The visually enhanced reports by Google Analytics provided information on where visitors came from, what pages they visited, how long they stayed on each page, how deep into the site they navigated, where their visits ended, and where they went from there. By analyzing the data from Google Analytics, we made changes to our website and compared web usage data from before and after the changes, concluding that our website was improved in a number of ways.

Objectives

The goal of this case study was to use [Google Analytics](#) to improve the design and content of the Rutgers-Newark Law Library's main website to better fit our visitors' needs. Our objectives were:

- To track the usage of the library main website

- To track visitors' behaviors
- To determine the efficiency of the website's menu system
- To make suggestions for improving user experiences
- To establish the most effective way for redesigning the website

Methodology

There are different methods for analyzing website traffic and usability. Our user services department at RNLL used to ask patrons to fill out paper-based surveys that asked questions regarding users' experiences with the website. However, paper-based surveys have limitations since the target groups are limited by their physical locations. The digital services department also built a webpage to conduct similar surveys online. Online surveys overcome physical location limitations, but because of their subjective nature they still cannot guarantee accuracy of results. In general, questions given in a survey can be open-ended or closed-ended: closed questions are considered more efficient and reliable while open questions can help get unanticipated answers in respondents' own words. Also, survey results could be dramatically affected by the way the questions are worded (Fink, 2002, pp. 4-6). Plus, these methods were time-consuming and required a great deal of human input.

Some schools have inserted counters on their home pages to monitor traffic volume coming to the site (Dyrli, 2006, p. 72). But this simple method is far from being good enough for those seeking deeper information about their websites as well as their visitors. Some schools have also used web server log files to gather similar information, and a lot of research has been conducted on web log mining (Srikant and Yang, 2001; Spiliopoulou, Faulstich, and Wilkler, 1999). For instance, Nicholas et al. (2006) have used log files to track user behaviors in finding information in a large digital library. Huntington et al. (2006), also used the log file to design a better web menu system. Let's put aside for now how effective their proposed approaches are. Simply cleansing and digging web server log files, which have thousands of tab separated lines, is a nightmare. There are some utilities that can help people analyze log files, but their functions are very limited and the results are not accurate if the log files are not set up correctly.

In contrast, web analytics offer objective and multi-faceted statistical data in a visual way for webmasters to better understand the interaction between their visitors and their websites. According to the Web Analytics Association (2006), "Web Analytics is the measurement, collection, analysis and reporting of Internet data for the purposes of understanding and optimizing Web usage." With web analytics, one does not need to worry about location-based problems inherent in paper-based surveys or about receiving inaccurate information. Plus, all the data is collected automatically with high accuracy. Examples of available web analytics tools include VisiStat, StatCounter, ClickTracks, and Google Analytics. By far the most sophisticated web analytics tool is Google Analytics (Dyrli, 2006, p.72). It is a valuable tool for those who need to determine their website's performance in a fast and reliable way (Jasra, 2006). Google Analytics was made available by Google to the public in August 2006. It

provides hosted service for web analytics, through which collecting and analyzing web usage data can be done in a finger-snap.

In this article, we examine Google Analytics' functionalities and discuss how this free yet powerful utility has helped improve our website development. This is a case study with an experimental approach. Our findings can provide insights for other libraries on using Google Analytics for website redesign.

Background: Rutgers-Newark Law Library for the Center of Law and Justice

Rutgers-Newark Law Library is part of Rutgers School of Law-Newark. With more than half a million volumes, RNLL is the largest law library in New Jersey. Its collections include the statutes and court decisions of all 50 states, federal statutes and caselaw, federal and New Jersey regulations and administrative decisions, federal and New Jersey legislative history materials, the codes of ordinances for many New Jersey municipalities, Anglo-American legal periodicals, the primary materials of international law, extensive historical materials on English law, and a special collection of criminology and criminal justice materials.

The primary mission of the library's website is to serve the educational and research needs of the faculty and students of the Rutgers University School of Law. To the extent that it is compatible with its primary mission, the library also provides service to others. According to the information gathered by Google Analytics, our two major websites, the [Rutgers-Newark Law Library website](#) and the [New Jersey Digital Legal Library website](#), attract more than 2,200 visitors per day. Thanks to Google Analytics, we now know that our visitors come from all over the world, including non-English speaking countries, such as China.

Google Analytics Background

In March 2005, Google acquired a web analytics firm called Urchin Software. Thousands of popular websites and marketers used to use software solutions from Urchin to better understand user experience as well as to optimize content (Google, 2006b). Later, in November 2005, Google released the online version of Urchin, named Google Analytics. Unlike the original Urchin, which was priced from \$899 to \$4,995 (Xooni, 2006), Google offers this hosted service for free. Due to the popularity of the service, Google placed new applicants on a waiting list until Google Analytics became generally available to the public in mid-August 2006.

Anyone with a Google account can use [Google Analytics](#). Once a Google account holder signs up for Google Analytics, Google sends a confirmation email and provides code to insert into each webpage to be tracked. The code has to be inserted right before the `</body>` line in the HTML code of each page to be analyzed. Our webpages are generated dynamically from some templates, so our whole installation procedure was done within 20 minutes.

Google Analytics can be easily deployed on multiple websites (Whiting, 2005). Tracking code has to be inserted in each and every page to be tracked. We had to ensure that this insertion was done in a precise way, or our tracking results would not be accurate. As we've mentioned, our website is dynamically created based on page templates. It was not a difficult task to insert tracking code into our sites. However, this could be a nightmare for those who have hundreds of static webpages.

Usually, Google Analytics will start tracking as soon as coded webpages are online. However, reports offered by Google Analytics average a two-hour delay. For instance, results for 10:00 a.m. show up around noon, meaning that visitors' activities cannot be tracked in real time.

According to Google Analytics' Terms of Service, "the Service is provided without charge to you for up to 5 million pageviews per month per account, and if you have an active Adwords campaign in good standing, the Service is provided without charge to you without a pageview limitation" (Google, 2006d).

Google Analytics data can be exported; however, we cannot import our own data into Google Analytics. For example, web server log files cannot be imported into Google Analytics. As Google Analytics states on its website (Google, 2006c), it generates "aggregated non-personal information" to share with third parties. (Google, 2006a). Thus, high-security websites are recommended not to use this service.

RNLL's Use of Google Analytics

The Digital Services Librarian took advantage of the following Google Analytics features: easy installation, keyword comparison, visualized summaries, trend reporting, defined funnel navigation, content by titles, site overlay, visitor segmentation, and data export. We will discuss these features in more detail below.

As mentioned in the Google Analytics background section, using Google Analytics requires nothing but copying and pasting the tracking code into each of our webpages. Since all the webpages on our website are generated dynamically, we simply inserted the tracking code in the template, and all the pages based on this template were thus tracked.

Google Analytics has the capability of tracking both paid search and unpaid search from Google or other search engines for keywords that take the visitors to our website. This feature allows webmasters to perform keyword comparisons across search engines and get insight into popular keywords that bring in visitors.

The Visualized Summaries feature is what we liked the most. Though many librarians may not be interested in numbers and statistics, Google Analytics provides an excellent analytic solution that contains 80 predefined visualized reports that explain complex statistical data in a simple and easy-to-understand manner. For instance, on logging into Google Analytics, we saw a quick summary of our website

activities for the current week (see Figure 1). This summary told us how many visitors had visited our website, how many pages they had viewed, how many of them were new visitors or returning visitors, where they were coming from and which website or search engine had referred them to our website. This “digital dashboard” feature greatly enhanced our productivity, since we didn't need to spend a lot of time reading numbers and analyzing data. It also provided powerful evidence to convince other librarians and administrators of the necessity of making changes to the website.

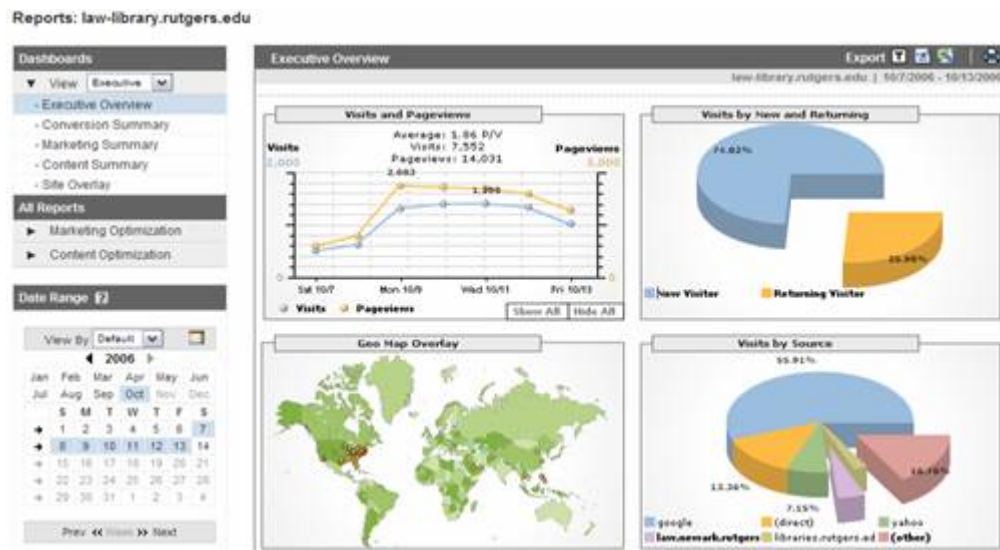


Figure 1: Visualized Summaries

The Trend Reporting feature allowed us to compare data from different date ranges. We used this feature mainly for comparing data before and after the website redesign. For instance, new visitors to our website have increased by 21% and returning visitors have increased by 44% (see Figure 12).

Navigation is a major part of the user experience on the web (Lazar, 2003). Were our visitors following the path we had designed, or were they just groping around? By using Defined Funnel Navigation, we found out how many users were accurately following the path we had designed to reach a target page (goal). This tool allows webmasters to define up to four goals, each with ten steps (links), to monitor visitors' navigation path (Tyler and Ledford, 2006). For example, Defined Funnel Navigation showed that 2.33% of the visitors to our New Jersey Digital Legal Library website clicked on the link to our Council on Affordable Housing (COAH) collection main page (see Figure 2). Among those who visited our COAH collection main page, 100% of them browsed our collection by years. 4% of the visitors who accessed the Browse by Year page got to it through direct links.

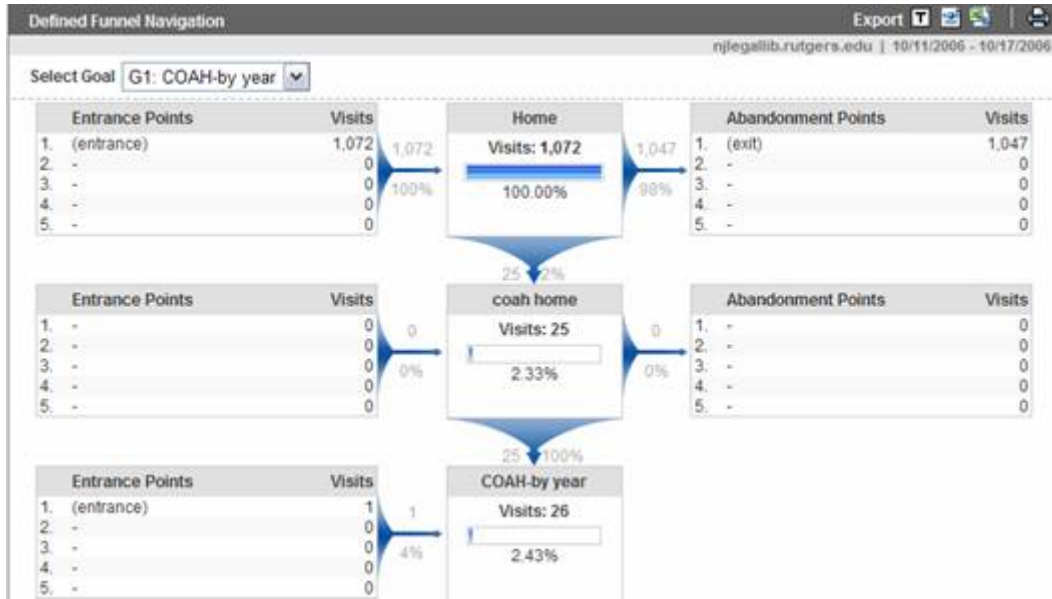


Figure 2: Defined Funnel Navigation

Content by Titles presents a list of the most popular items on our website. By analyzing data from this feature, we figured out what content was attracting visitors. For instance, we learned that our top hit between September 18, 2006 and October 9, 2006 was the Same-Sex Marriage page (see Figure 3).

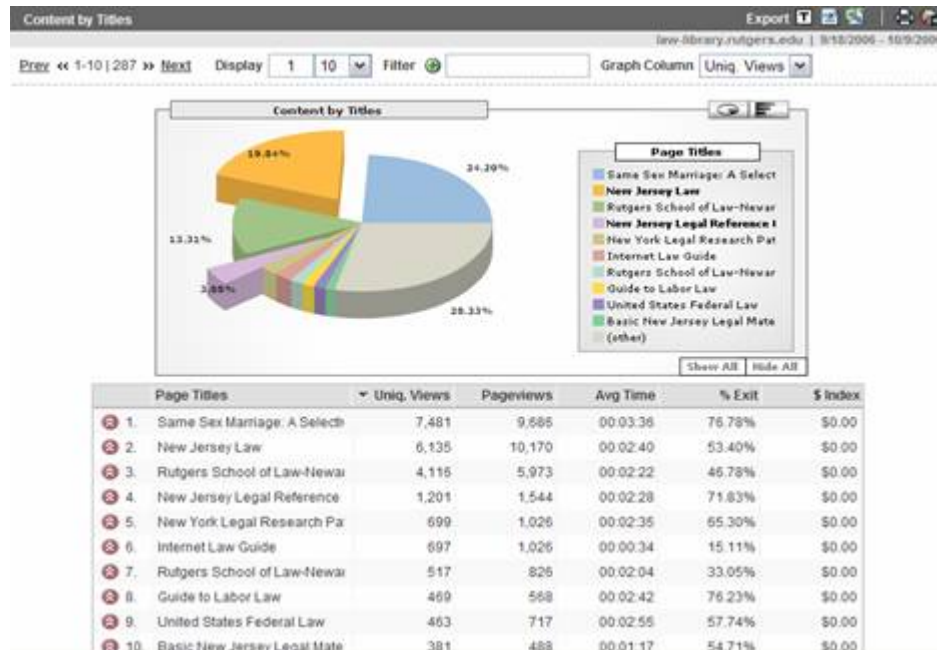


Figure 3: Content by Titles

Site Overlay shows instance clicking summaries laid over an actual webpage (see Figure 4). This feature gave us a direct way to find out if a link had been clicked,

as well as the number of clicks on each link. Even more excitingly, when we clicked on a link on a Site Overlay page, we were redirected to whatever it linked to, and that page would then display in the same Site Overlay summary style. In short, we could collect statistical data as we browsed through our website within Google Analytics.



Figure 4: Site Overlay

The Visitor Segmentation feature adds 18 more predefined segments for further drill-down into any of 80 Google Analytics reports (see Figure 5). By employing this feature, we could combine any Google Analytics report with other information, such as country, region, and keyword, to generate a new report that presents visitors' detailed information. For instance, we could see detailed information about visitors who viewed our same-sex marriage page and where they were coming from—that is, visitor segmentation based on region (see Figure 6).



Figure 5: Visitor Segmentation Menu

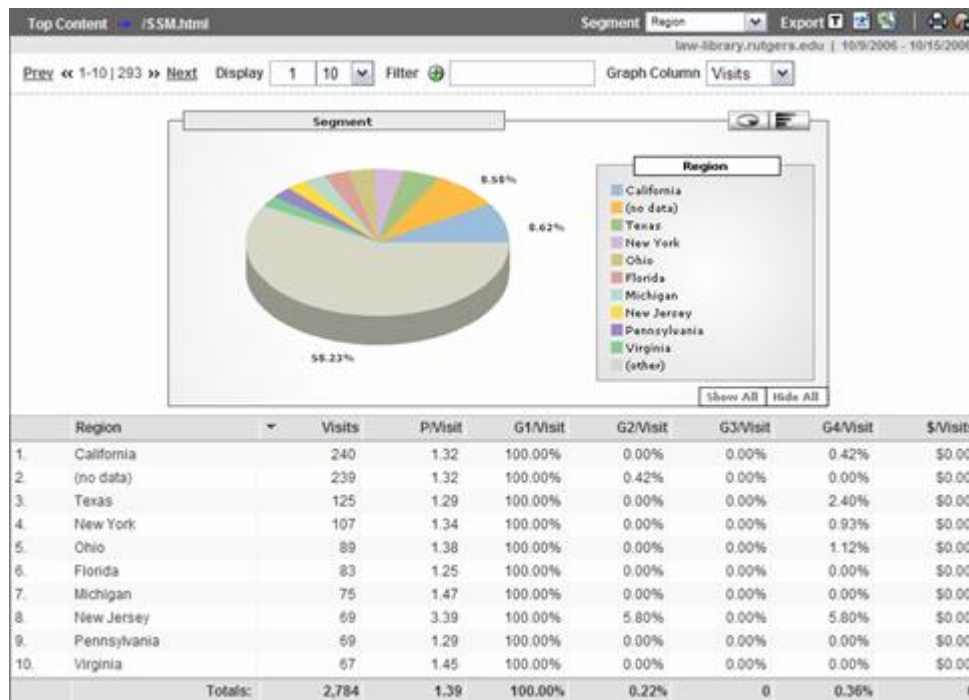


Figure 6: Visitor Segmentation - Region

Google Analytics allows users to export report data in text, XML, and MS Excel formats. This feature is powerful because it generates data that can be analyzed with other statistical programs. Figure 7 is an example of exported data in text format. This list showed our visitor loyalty information. It could be imported to MS Excel or other statistical software for further analysis.

Profile Name: law-library.rutgers.edu

Visitor Loyalty

Date Range : 9/18/2006 - 10/9/2006
9/17/2006

Date Range (2): 8/27/2006 -

Visit Number	Visits	Visits(2)
1	17679	14595
2	1967	1452
3	619	441
4	310	192
5	190	112
6	126	74
7	96	48
8	76	42
15-25	259	171
26-50	306	242
51-100	383	175
101-200	392	378
201+	1043	681

Figure 7: Data exported from Google Analytics

RNLL's Findings from Google Analytics

We have been tracking our two websites since July 29, 2006. We have mainly monitored Site Overlay, Content by Titles, Funnel Navigation, Visitor Segmentation, and Visualized Summaries. Information on visitors' connection speed and computer configuration was also collected and analyzed. Based on the information collected and analyzed by Google Analytics from July 29 to September 10, 2006, we discovered that:

1. Though about 85% of visitors used high-speed internet connections, such as cable, DSL or corporate networks, 15% of visitors still used dial-up or other low-speed connections.
2. 85% of visitors used Internet Explorer as their browser, and about 11% of visitors used Firefox.
3. 55% of visitors used screen resolutions of 1024 × 768, and 21% of them used 800 × 600.
4. The right-hand menu on our main website provided clickable news headlines from JURIST, which is a JURIST is a “web-based legal news and real-time legal research service” hosted by the University of Pittsburgh School of Law. The Site Overlay showed that these links generated very few clicks. This menu took up about 20% of the webpage layout, so it was definitely underused.
5. According to Content by Titles, the Research Portals on the left-hand menu of our main website had fewer visits than we had anticipated.
6. New Jersey Digital Legal Library is our major digital project for serving the law community in New Jersey. Our Defined Funnel Navigation indicated that very few visitors were referred to this website from our main website.
7. Initially, we tried to use the Site Overlay feature to see the number of clicks for each link, but during the viewing process we realized that items in the Quick Links section on the left-hand menu were hard to differentiate (Berger, 2006) because all the links were underlined and they didn't change when moused over. Also, Quick Links such as Contact Us, Library Hours, and Library FAQ on the left-hand menu actually pointed to different portions of the same webpage.
8. Visitor Segmentation showed that 83% of visitors were coming from the United States. About 50% of U.S. visitors were from New Jersey, and 76% of these were from Belleville and Newark. These results matched our predictions for patrons' geographical patterns, and Google Analytics was the first tool to provide evidence to confirm those predictions.

Hypotheses and the RNLL's Website Redesign

Google Analytics can report facts about the monitored website but is unable to make suggestions on how to improve it. In order to make effective changes, our reference librarians and administrators were involved in the decision-making process. The decision-making process for our website redesign was as follows:

Once the Digital Services Librarian received and interpreted the reports from Google Analytics, he distributed the interpretation of the reports to reference librarians and administrators. Based on their feedback, the Digital Services Librarian developed new design suggestions that in turn received further comments. Final decisions about website design were made by administrators. All accepted changes were implemented by the Digital Services Librarian, who continued to monitor Google Analytics Reports and repeated the above process as necessary.

Based on the information collected on visitors' connection speed, we realized that it would not be a good idea to add more graphical content to the new design since 15% of our visitors still used low-speed connections. Also, we decided to keep our 800 × 600 webpage template based on the screen resolution information of our visitors. We noticed that 96% of visitors were using Microsoft Internet Explorer or Firefox as their browsers. Our current JavaScript and Cascading Style Sheets worked perfectly with these browsers and thus we could continue to use them. In other words, we decided not to change the layout and style of our website (see Figure 8). On the other hand, we changed a number of things on our website as the result of using Google Analytics.

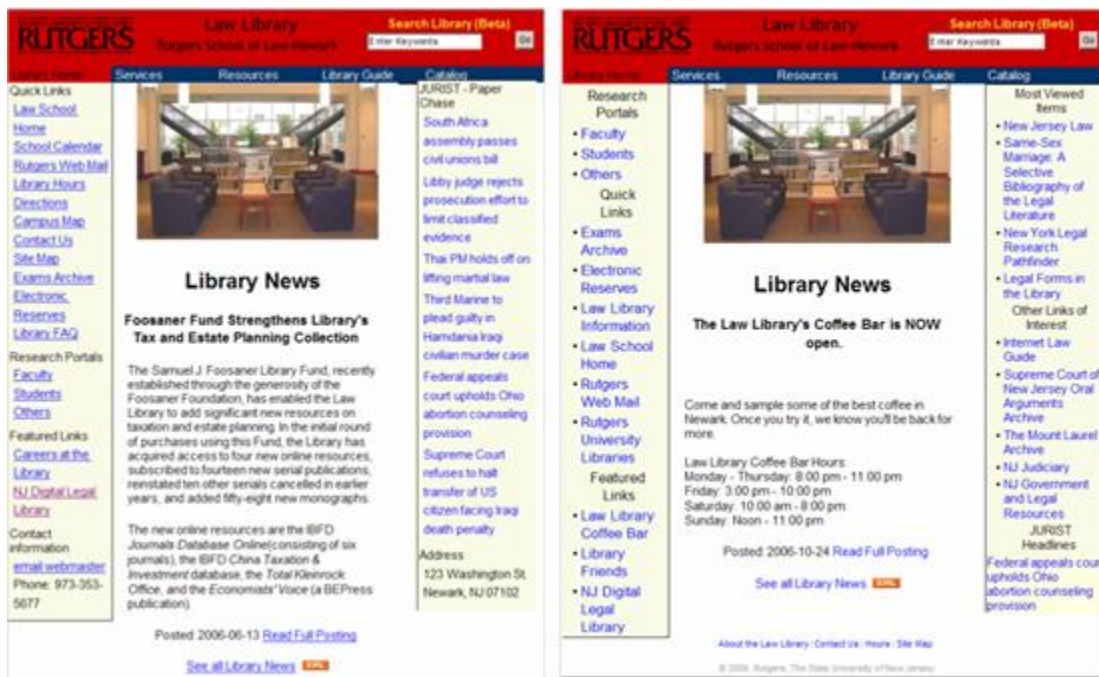


Figure 8: Before (left) and after (right) the modifications of our website

Hypothesis 1: Adding a Most Viewed Items section based on the Content by Titles list will attract more visitors to these pages.

We decided to add a Most Viewed Items section to the right-hand menu (see Figure 9, RC 1). These items were based on the Content by Titles list from Google Analytics. Although they were the most popular items on our website, Google Analytics reports showed that visitors actually located them by using search engines. Adding a Most Viewed Items section could better promote popular content that had previously been deeply buried. It could also help retain first-time visitors.

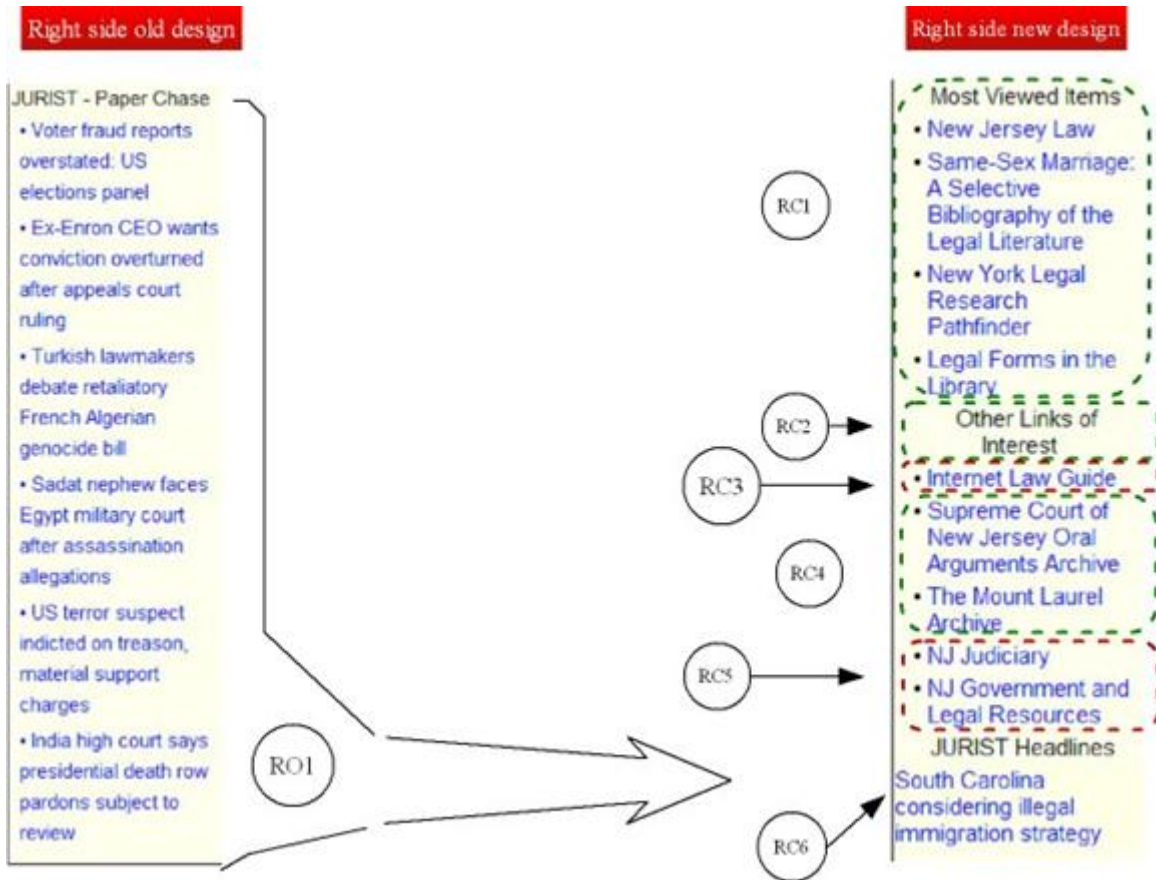


Figure 9: Old right-hand menu bar (left) and new right-hand menu bar (right).

Hypothesis 2: Adding an Other Links of Interest section to the main page's menu will further promote popular pages.

On the right-hand menu bar, we developed a new section called "Other Links of Interest" (see Figure 9, RC2). The reference librarians suggested inserting our major content, the Internet Law Guide, at the top of this section (see Figure 9, RC3). They also suggested two popular external links for this section (see Figure 9, RC5). Based on the information collected from Google Analytics, the Digital Services Librarian suggested two top hits (see Figure 9, RC4) from the New Jersey Digital Legal Library so that visitors could also be brought to our own major projects.

Hypothesis 3: Reorganizing and reformatting the menu will better meet the needs of visitors and librarians.

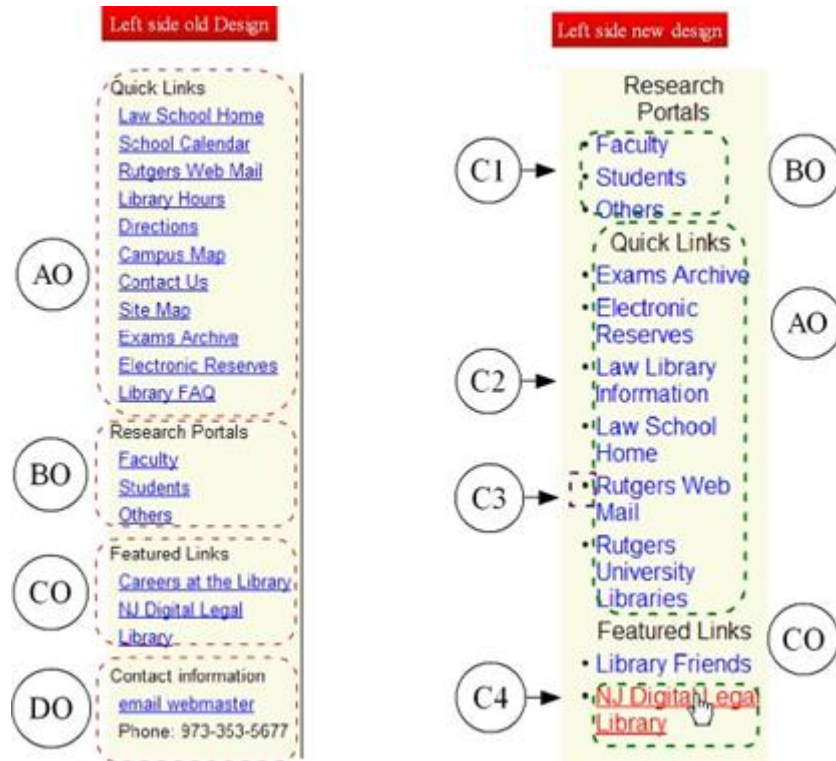


Figure 10: Old left-hand menu bar (left) and new left-hand menu bar (right).

For all the items on the right- and left-hand menu bars, we added a mouse-over effect and increased the font size (see Figure 10, C4). We bulleted items so that they can be easily differentiated from each other (see Figure 10, C3) (Wan, 2006). In order to better promote the Research Portals, we moved them to the top of the left-hand menu (see Figure 10, BO and C1). We then reorganized both the Quick Links section and the law information page, which is one of the new Quick Links (see Figure 10, C2). In addition, we moved Contact Information to the law library information page (see Figure 10, DO). However, reference librarians indicated that they still wanted one-click access to the Hours, Contact Us, and Site Map information that used to be in the left-hand menu bar. It takes at least two clicks to find this information after clicking on the new Law Library Information link, so we created a new footer section that has one-click access to these items (see Figure 11).

[About the Law Library](#) | [Contact Us](#) | [Hours](#) | [Site Map](#)

© 2006, Rutgers, The State University of New Jersey.

Figure 11: Footer section with one-click access to frequently needed information.

After discovering that the JURIST headlines were rarely clicked on, we agreed to reduce the space taken by these headlines (see Figure 9, RO1). These links were kept on our main website since administrators thought that they were of interest to some users. In order to reduce the space taken up by JURIST headlines, the Digital

Services Librarian designed a new program so that those headlines would roll over every six seconds in a much smaller form (see Figure 9, RC6). By making this reduction, we generated about two thirds more space on our right-hand menu. We inserted some new sections and items, hoping that they would be more popular than the JURIST headlines. We hoped that the redesign of menus will bring more users and keep them at our pages.

Discussion

We launched the redesigned RNLL website on September 18, 2006. We have continued to track the website through Google Analytics since then. We defined the pre-modification time range from August 27 to September 17, 2006, for a total of 22 days. For comparison, we defined a post-modification time range, the 22 days between September 18 and October 9, 2006. All dates were after the school's opening date. The results supported our hope that the redesign would improve our website, as we discuss below.

Site Overlay supported our first hypothesis that a Most Viewed Items section would be popular with visitors: each of these top links averaged 30% more traffic after the site redesign.

Google Analytics also supported our second hypothesis that adding an Other Links of Interest section to the main page would further promote popular pages. For example, we added links to the NJ Digital Legal Library website. Google Analytics showed that referrals from our main website to NJDLL increased by 23.4%. Considering the fact that this website had about 200 visitors per day, this 23.4% gain was significant.

Finally, Google Analytics supported our third hypothesis that reorganizing and reformatting the menu would better meet the needs of visitors and librarians. Clicks to these links increased after we moved the Research Portals section from the middle to the top of the left-hand menu: Faculty by 42%, Students and Others by 55%. Another change that had a major impact was the addition of the Law Library Information link; 16% of those who visited the Library Guide page had followed that link.

We used Google Analytics to determine whether or not the redesign worked, based both on the number of times visitors came and returned to the site and on how many pages they viewed during each visit. Overall, we found that new visitors increased by 21% and returning visitors increased by 44% (see Figure 12). Return visits told us that there was enough content for our users to continue coming. This was confirmed by a 3% decrease in the percentage of visitors who visited our website only once and a 2.5% increase in the percentage of visitors who visited three or more times (see Figure 13). Also, the number of pages viewed during each visit told us whether our visitors were attracted by our content. The number of people who viewed more than three pages increased by 29%; this showed that more visitors were attracted by

our content and that they stayed and viewed more pages instead of coming and going transiently. By promoting interesting content that previously had been deeply buried in our website, we successfully attracted more return visitors and achieved better loyalty.

Visitor Type	Visits
1. New Visitor	
8/27/2006-9/17/2006	14,595
9/18/2006-10/9/2006	17,679
% Change	21.13% ↑
2. Returning Visitor	
8/27/2006-9/17/2006	4,204
9/18/2006-10/9/2006	6,056
% Change	44.05% ↑
Totals:	18,799
	23,735

Figure 12: New Visitors and Returning Visitors

DateRange 1:

9/18 - 10/9/2006 DateRange 2:

8/27 - 9/17/2006

Total visits	23446	18603
% single-visit visitors	75.4%	78.5%
Total visitors with at least three visits	3800	2556
% visitors with at least three visits	16.2%	13.7%

Figure 13: Visitor Loyalty Analysis

Based on above analysis, we concluded that our visitors were satisfied by our new design. Authors of popular pages are inspired by the positive feedback from our visitors and are willing to keep updating their pages as frequently as possible. Our reference librarians and administrators think that we've made positive movement and are satisfied.

Conclusion

As we have discussed, Google Analytics is a great tool for constructing user-centered websites. It offers a user-friendly interface and informational reports that allow for quick identification of problems. We've discussed how our library used the features of Google Analytics and how its reports helped us make design decisions for our website. A comparison of the data before and after the redesign show that we

improved our website, which now brings in more traffic, achieves better loyalty, and has better navigation for visitors. Libraries interested in knowing more about the interaction between their websites and visitors should consider using this service.

We are in the process of redesigning the NJDLL website using Google Analytics, and we will present our findings in the future. Also, we've decided to deploy Google Analytics in our catalog to track catalog visitors and find ways to improve their experience in the catalog. Meanwhile, we will continue to explore Google Analytics' many features.

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