



Applying best practices in web site redesign: the Queens College Libraries experience

Web site
redesign

James T. Mellone and David J. Williams

*Queens College Libraries, City University of New York,
Flushing, New York, USA*

177

Received August 2009
Revised October 2009
Accepted December 2009

Abstract

Purpose – The purpose of this paper is to examine the best practices in web site redesign the authors established for its two interconnected parts, the web development process and web design. The paper demonstrates how best practices were applied to coordinate a library web site redesign project and to engineer the web site for optimum usability, resulting in the creation of a new improved web site.

Design/methodology/approach – A problem-solution approach was used to analyze how the Queens College Libraries (QCL) fell behind in web technology and how it revitalized its web operations. The paper presents a detailed exposition of a three stage project, and provides reasons for adopting best practices in redesigning each web site area.

Findings – In a resource-challenged mid-sized academic library, like QCL, it is still possible to create a fully functional easy-to-use web site.

Practical implications – The QCL experience has lessons for other libraries in similar circumstances. A mid-sized academic library adopting a best practices approach to web redesign can successfully coordinate an open and inclusive development process and use public web standards to engineer a functional web site responsive to user needs.

Originality/value – Unlike other case studies of web redesign projects at academic libraries, this paper focus on both the web development process and web design, explicating the establishment and application of best practices for both areas.

Keywords Academic libraries, Best Practice, Internet

Paper type Case study

1. Introduction

This case study examines the best practices the authors developed as a web team to coordinate a library web site redesign project and engineer the web site for optimum usability. Like many other mid-sized public academic libraries, the Queens College Libraries (QCL) was resource-challenged in both human and physical resources. The goal was to engineer a web site which would make library information easier to find in a practical way. Web redesign consists of two interconnected parts, the web development process and web design. The authors established best practices in both areas and completed the redesign project by applying them, making the creation of a new improved web site a reality.

Academic libraries usually function best as a collaborative working environment. Web project results can be optimized by linking knowledge of web technology to cooperative colleagues through a well-coordinated venture. The authors based their best practices in web development on principles learned from years of experience with technology-driven projects. Similarly, they used principles of good web site design gleaned



from years of experience with library and web users, and reflective of conventional web wisdom. The team applied the following best practices to the redesign project.

Best practices in web development

- (1) Leadership and teamwork were essential. A redesign project needs to be led by a librarian or coordinator on a regular basis. Fortunate libraries have at least one person as coordinator who is both a librarian and a technician, a web librarian of sorts. Less fortunate libraries need a librarian and a technician to work as a team. Those with a web librarian will invariably need that person to work closely with one or two others on the project, so teamwork applies to multiple scenarios.
- (2) Collaboration was needed among the library professionals who used the web site to instruct users and who participated in shared governance of the library.
- (3) Sound and sustainable decision making was facilitated by the coordinator. Deliberation with colleagues helped make decisions sound. The testing and review of implemented decisions helped make them sustainable. The team used a three-step process coordinating two working groups, one to make decisions, the other to provide feedback:
 - *Step 1.* Working group one for decisions:
 - identify an issue;
 - discuss solutions;
 - decide tentatively on a solution;
 - produce a testing mock-up; and
 - communicate to colleagues.
 - *Step 2.* Working group two for outreach:
 - review feedback from colleagues; and
 - make recommendation to working group one.
 - *Step 3.* Working group one for decisions:
 - discuss recommendation from working group two;
 - decide finally on a solution;
 - revise testing mock-up; and
 - Communicate to colleagues.

Best practices in web design

- Organization and taxonomy of the web site were the foundation. Semantic language was used to label the organizational elements and taxonomy of the site. The flow of information was kept consistent in an alphabetically ordered sequence.
- Design and functionality were driven by a functional approach, one in which function dictated form. A fluid layout helped achieve a design that is device- and platform-neutral. Browsing was made easy by providing common navigation links in every document and by placing content elements in-line. To enhance visual recognition the team used colors and design elements familiar to their institutional users.

- Available technology and technical skills were used to their fullest, including adoption of the World Wide Web Consortium (W3C) standards of Extensible Hypertext Markup Language (XHTML) and Cascading Style Sheets (CSS), and use of the UTF-8 version of Unicode for text.
- Operability and features were programmed in commonly-used languages such as JavaScript (client-side) and PHP (server-side), and by adopting the concept of “graceful degradation” to achieve “progressive enhancement” the team made due provision for those agents unable to interpret such scripting[1].

The adoption of best practices for web development and web design enabled QCL to overcome the lack of resources in personnel and advanced tools to engineer a redesign to satisfy its needs. As it turned out the library succeeded in creating more than a functional web site, perhaps even an admirable one under the circumstances. The team coordinated an open and inclusive development process with colleagues resulting in their support of the redesign. The authors think the beauty of the web site is in the simplicity of its construction, its use of open standards, and in the enhanced operability and features achieved by using common programming languages (i.e. JavaScript and PHP).

2. Literature review

A large library of technical guides cover best practices for web design in general. The team made use of the most up-to-date web standards called from them and based upon the authors' own experience. In the library community, Fox (2008) has advocated for the approach QCL adopted of creating a simple web site based upon web standards responsive to user needs; however, a guide is not available on how best practices for web redesign can be identified and applied in an academic library setting, especially one which is resource-challenged. In addition, the numerous case studies documenting library web design projects usually pertain to large academic libraries who have sufficient resources to conduct usability studies upon which to base their redesign. They do not focus on best practices, neither their creation nor their application.

The trade literature has recently covered two interesting projects. Garber and Hooper (2009) described the redesign of Austin Peay State University's library site using an MS-Frontpage template and input from student comments. Riley-Huff (2007) described only the first phase of a project at the University of Mississippi libraries to apply current W3C standards in a redesign of its main index. The scholarly literature also covers redesign projects at large academic libraries, such as Fuller and Hinegardner (2001) at University of Maryland at Baltimore, Ward (2006) at University of Washington, Bordac and Rainwater (2008) at Brown University, and McHale (2008) at University of Colorado Denver. All the redesigns were based upon extensive usability studies, as were two from mid-sized college libraries like those by Robbins *et al.* (2007) at Dowling College and Oldham (2008) at the University of Scranton. In addition, two articles documented projects at the University of Nevada-Las Vegas (UNLV's). Vaughan (2001) narrated the considerations and decisions made in designing three versions of UNLV's library web site. More recently, Felker and Chung (2005) focused entirely on the web development process of getting input from and working with many librarians. Lastly, Raward (2001) advocated for the use of a human-computer interface usability checklist of best practices in web design.

As the case studies indicate, a formal usability study is the optimal method of gathering user input to achieve a user friendly web site redesign. Unfortunately, QCL did not have the resources to conduct a formal usability study. Based upon long-standing reports and expressions of dissatisfaction with the web site, including specific reference to its overall lack of usability, the need for a redesign was not in question. QCL users had verbalized dissatisfaction with the web site, both orally and through written comments on informal questionnaires and surveys. QCL librarians knew what worked or did not work on the web site, by listening to those users, especially when assisting and teaching them.

In the past 15 years of public participation significant advances have been made in defining web site usability and establishing processes and methodologies for measuring the successful application of these principles (Nielsen, 1997). Although QCL did not conduct a formal usability study, the web team understood the concept of web usability, consulted the work of established researchers like Nielsen, and applied the principles based upon a genuine need.

Unlike other case studies, this one focuses on both the web development process and web design, explicating the establishment and application of best practices for both areas at a mid-sized academic library. The authors think other libraries in similar circumstances would benefit from the QCL experience in establishing and applying such practices to create a fully functional web site responsive to user needs.

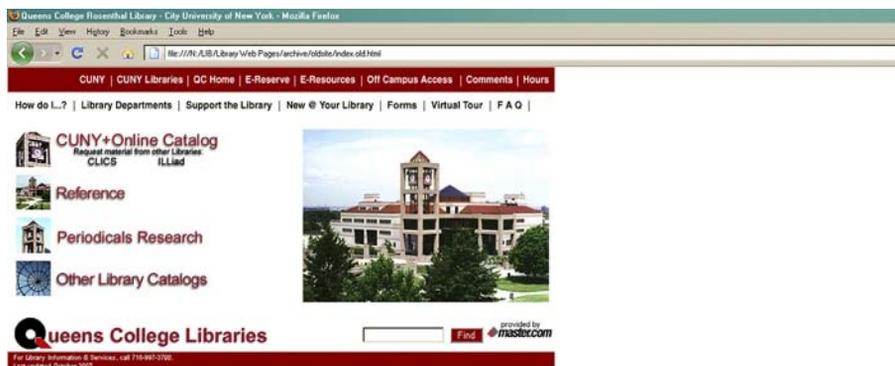
3. Assess the problem

In the non-profit or academic world doing “more with less” is a common mantra if not an imperative today. Public academic libraries, which typically have large needs but small budgets, are continuously faced with this imperative. The faculty and staff at Queens College (QC) of the City University of New York (CUNY), a four-year undergraduate institution of 14,000 students, with master’s degree programs for another 4,000 students, are consistently challenged with just such an ethos. With a personnel of approximately 50 professional and support staff, QCL does its best to meet the challenge of keeping current with web technology to provide quality instruction and service to its users in a resource-challenged environment.

Web development

The creation of the first QCL web site in the 1990s was the result of a collaboration by a few librarians and library systems personnel. A chairperson led a web committee that donated its time to construct a web site that worked well for years. But the increase in library services had combined with newer technologies to create expectations difficult to meet, primarily because no library personnel were dedicated to working solely or primarily on the web site. Those involved with it had added work to their extensive responsibilities to get the site up and running, but the kind of time commitment necessary for continued growth could not be maintained indefinitely. Librarians and systems technicians continued with their primary responsibilities, unable to devote extra time to web development, and there was no funding to hire specialists to work in web development[2].

Although the original QCL web site (Figure 1) had been improved in minor ways since 2000, by 2007 web development occurred at a even slower pace. There was no plan for moving the web site forward, and it continued to operate on borrowed time. In addition, the site was available through the shared college web server using Secure Shell and a typical PHP installation, so making substantial improvements through



Note: December 2007

Figure 1.
Original web site,
front page

database-run applications was not an option. In such a challenging environment how could the QCL web site be redesigned?

Web design

By 2007, the web site was hindering the library's ability to provide information and services effectively to its users. The web team assessed five major areas of the front page (main index) that needed revision: visibility, usability, terminology, clutter, and repetition. Visibility was weakened because the front page had been converted previously to an image-based format for a more attractive appearance, but the changes took more time than if the page had been in HTML. Its fixed resolution at 800×600 pixels grew outdated quickly and made it less visible in other resolutions.

Usability was limited because the categories had mouse-over capability only and were spaced in a tight formation. It was common for users and librarians to get misdirected in such a floating menu structure. The terminology confused users because the front page was organized in primary categories that no longer resonated with them (e.g. Reference). Over time the web site had become so cluttered as to be unfriendly, with additions having been made without restructuring the architecture. The front page (Figure 2) was filled with links to secondary information (e.g. e-resources) that competed with the primary categories for users' attention. The secondary structure had also grown disparate. Repetition, though well intentioned, had crept in and became counterproductive for the browsing user and the library instructor. For instance, Library Departments grouped services and departments in a long list even though many were neither a service nor a department, but it still contained important information like the Phone Directory. Other items, such as hours, were in the same grouping and were repeated on the top menu as secondary information.

4. Build the solution

By implementing the web team's best practices a more effective structure was built. To facilitate web development, QCL discarded the committee and chairperson

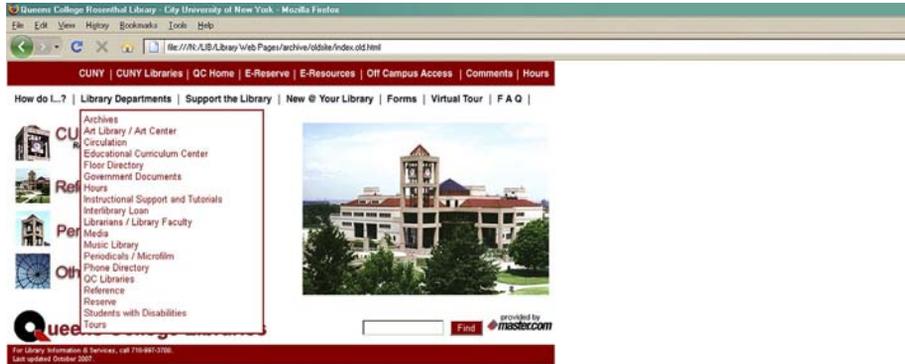


Figure 2.
Original web site,
front page, mouse over
of Library Departments

Note: December 2007

format to create a new web team composed of a coordinator and a half-time technician. The coordinator facilitated meetings and decision making, communicated with colleagues, and helped with web markup, while the technician worked solely on web design, markup, and programming.

The two-year project spanned from Summer 2007 to 2009. At the outset, the web team assessed the web site to create a staged plan of action implemented as follows. In Stage One (Fall, 2007), the original web site was modified. In Stage Two (Spring/Summer 2008), a complete redesign was engineered and a new web site launched before the start of the fall semester. During the fall the team made enhancements in operability and added interactive features. In Stage Three (Spring 2009), they improved the site and documented their work for their successors. With a more direct approach to operations the team was attentive to the concerns of professional colleagues, and made every effort to collaborate with them while making sound and sustainable decisions.

To foster new ideas in this collaboration, two working groups of librarians were drafted for web advising. The Homepage Design Group (HDG) facilitated decisions regarding web design, information architecture, and web content. The group consisted of the three professional librarians most recently hired who were more comfortable with web technology. The Web Resources Group (WRG), created primarily as an advisory group for electronic resource decisions, served as a second deliberative body for web issues, particularly regarding research and reference content. The WRG consulted with all bibliographers for electronic resource and web issues to incorporate them into the process. The WRG was composed of four bibliographers who represented the four subject divisions QCL covers: the arts and humanities, education and library science, the sciences, and the social sciences. This model supported a broader consensus in decision making. The HDG met on a bi-weekly or monthly basis, and the WRG provided review and feedback as needed.

To overcome the lack of advanced tools the web team made smart use of the technology and technical skills available, namely the public standards of HTML

and CSS. They used a good free text editor (Notepad++) to write HTML, and to program the more advanced features in the common languages of JavaScript and PHP.

5. Stage one: interim web site

The first step in the redesign was to make the original web site more usable.

It was tweaked to quickly address the five problem areas of visibility, usability, terminology, clutter, and repetition. For visual continuity the web team changed the front page (Figure 3) to HTML broadening its width to accommodate the common resolution of 1,024 × 768 pixels, but kept a similar look using the same colors and layout. The same red top and bottom borders remained but the top menus were reduced from two to one, with the QCL image being placed above the top menu. The library photograph was kept in a similar position, while the QCL contact information appeared in the center block where the content of categories would display upon selection.

To improve usability the team changed the mouse-over behavior of the categories to clickable links. To make the site's terminology more intelligible the number of primary categories was decreased to five and renamed to make sense to users, thus abandoning library jargon wherever possible. The Catalog was retained as a primary category link, and primary pages placed in new categories called Research, Services, How do I? and About Us. The team also changed the names of primary pages, and created titles for nested lists – for instance, Periodicals Research became Find Articles. Similar semantic changes were made to the names of secondary services, and each category decorated with icons for enhanced visual recognition (Figure 4).

To clean up the clutter and repetition the team collapsed all primary pages into the categories, and lessened the number of secondary pages (e.g. Hours) or secondary

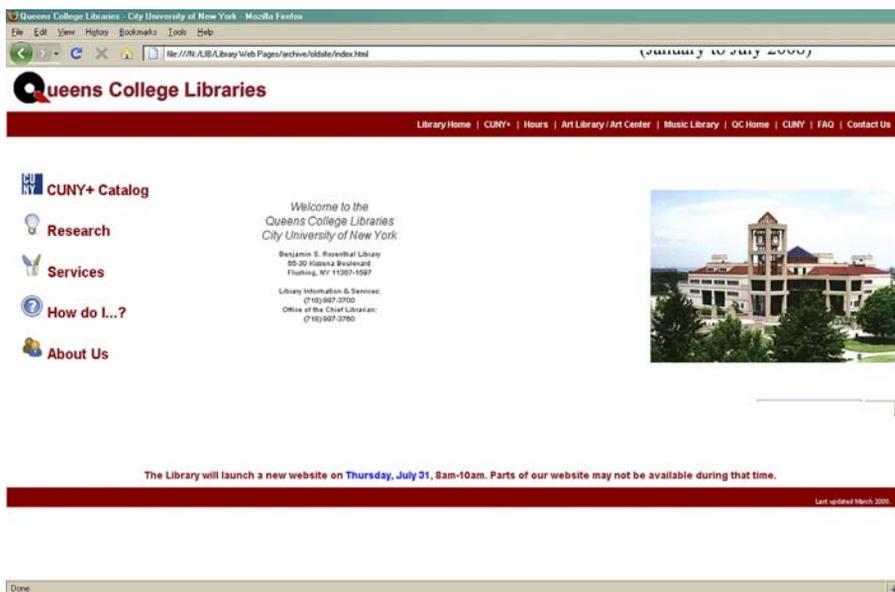


Figure 3. Original web site, revised front page

Note: January-July 2008

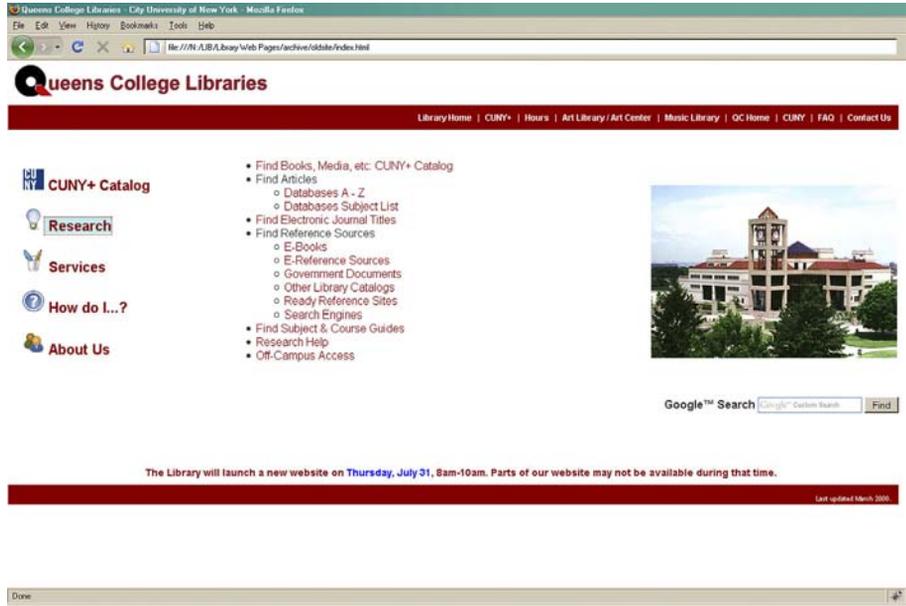


Figure 4.
Original web site, revised
front page Research
area list

Note: January-July 2008

college links (e.g. Music Library) into the top menu. Also reduced were the secondary links on the front page and within the primary categories so that a secondary link (e.g. Databases) only appeared in one place (e.g. Research). The new design was released before the spring semester began to the almost universal approval of library colleagues. Anecdotal evidence suggests the interim web site significantly improved the user experience during its six-month life.

6. Stage two: engineer a new web site

In February 2008, QCL began to reconceptualize the design and architecture completely. The goal was to organize the site content to reflect QCL offerings in a more discoverable and functional way. Discoverable, in that the arrangement and naming of documents and elements would be intuitively useful to people familiar with web content, and functional in that it would reflect the organization and internal classification of library functions directly. First, the web team and groups decided what information needed to be represented.

Organization and taxonomy

Content was classified into 44 distinct categories (80+ web pages) organized in four major functional areas: research, services, collections, and information (About and Contact) (Table I).

Documents considered appropriate to a particular category were stored in a directory named after the function, below the root of the site (referred to as “/” using the UNIX/HTTP convention).

Research	Services	Collections	About	Contact
Ask a Librarian	Borrowing	Archives	Events	Comments
Connect from Home	Computing	Art	Hours	Employment
CUNY+ Catalog	Locating materials	Digital collections	Maps	Faculty and staff
Databases	Multimedia	Educational curriculum center	Mission	Friends of the library
Electronic Journals	Photocopying and printing	Government documents	News	Giving
Guides	Study spaces	Multimedia	Policies	Help
Instructional Services	Thesis binding	Music	Tour	Internships
Library Catalogs		Reference	Visitors	Subject specialists
Research Services		Special collections	Welcome	Volunteering
Search Engines				

Source: A full diagram of the site is available in the sitemap document, available at: <http://qcpages.qc.cuny.edu/Library/information/sitemap.php>

Table I.
QCL web site: sitemap

The first two areas, research and services, appeared in order of their frequency of use, from left to right. Collections occupied the center, and the two information categories, About and Contact, balanced out the right side (Figure 5).

The Research directory included the instruction subdirectory, which contained several documents for Instructional Services offerings. Guides subdirectories were formed for individual subject research guides created by bibliographers.

To maintain their purposeful flow, documents were grouped alphabetically wherever possible. The Services directory was the one exception because it contained a Borrowing subdirectory (Figure 6) with multiple documents referencing various services. Borrowing documents appeared in order of their frequency of use: QC Books & Media, CUNY Books & Media, Interlibrary Books & Articles, Course Reserves, Reserve Policies. Borrowing was also an exception in being the only instance where a sub-menu appeared in the main site navigation list.

To maintain clarity, the information section was split into two menus. About contained those documents describing QCL and its features, “the place.” Situated in Contact was information considered to be about “the people” at QCL, namely resources for communicating directly with library faculty and staff. Two subdirectories were also created, months and newsletter, to provide common locations for storing calendar and electronic newsletter documents.

In case QCL had been presumptuous in its taxonomy, it was important for a user to be able to browse and learn the purpose of categories by reading their descriptions. Therefore, an index document (e.g. /research/index.php) for each category described its content. The index page would serve another important purpose. If the primary navigation controls of the site were not available because scripting was not enabled, a user could locate documents in a given index because web servers by default provide an index page if no specific document in a directory is requested.

In the root directory were placed only four objects: the main index (index.html), a site-wide bookmark icon (favicon.ico) designed by the authors, and two documents

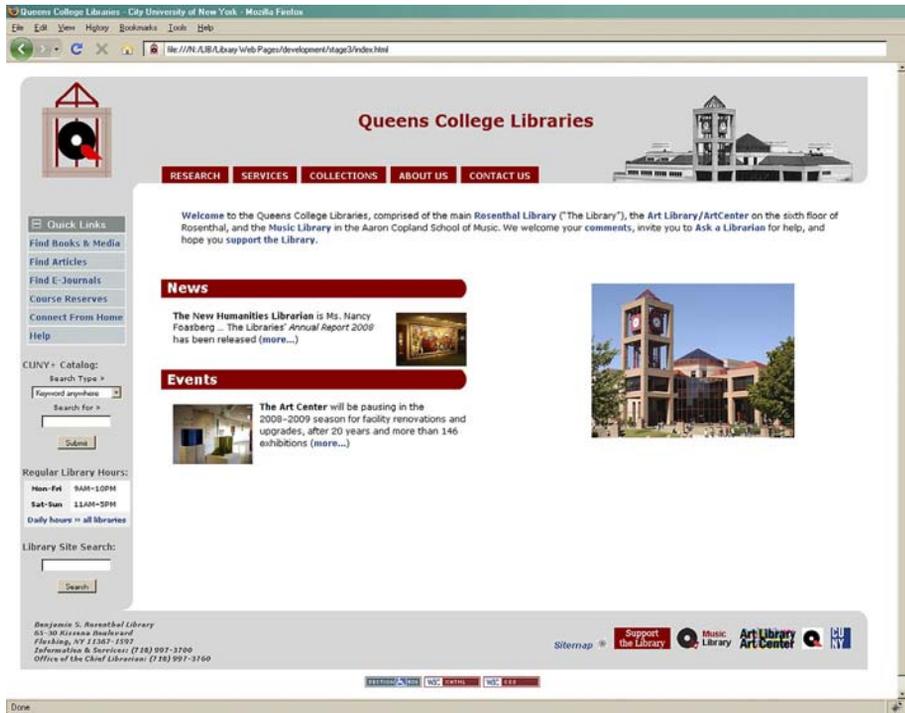


Figure 5.
New web site, front page

Note: August 2008-January 2009

used by the Google Custom Search engine. The team made the main index a completely static hypertext document without any server-side processing directives for assembling the page. This provided an example of a typical document's structure, and allowed the site to be completely rendered to a user even if the web server was unable to perform server-side processing. Several root-level directories were also created for storing content in consistent locations: one each for graphics, audio-visual materials, style sheets, programming code, and page-building templates.

With the working groups, the team created a taxonomy for classifying library documents for Databases, Guides, and Subject Specialists so the pages would consistently reference the same subjects. Over time, the college's usage of terminology to describe programs of study had been inconsistent, and some of this incongruous language had crept into the original web site. To assist bibliographers in authoring their contributions, the team created a consistent model for the writing of database descriptions and a word-processed template to create research guides. Although they often needed to perform editorial oversight, devising these aids for QCL librarians helped the team elicit contributions from colleagues more easily.

Design and functionality

Proceeding to the more difficult decisions of design and functionality, the working groups rejected the college template as inappropriate for library purposes, although the

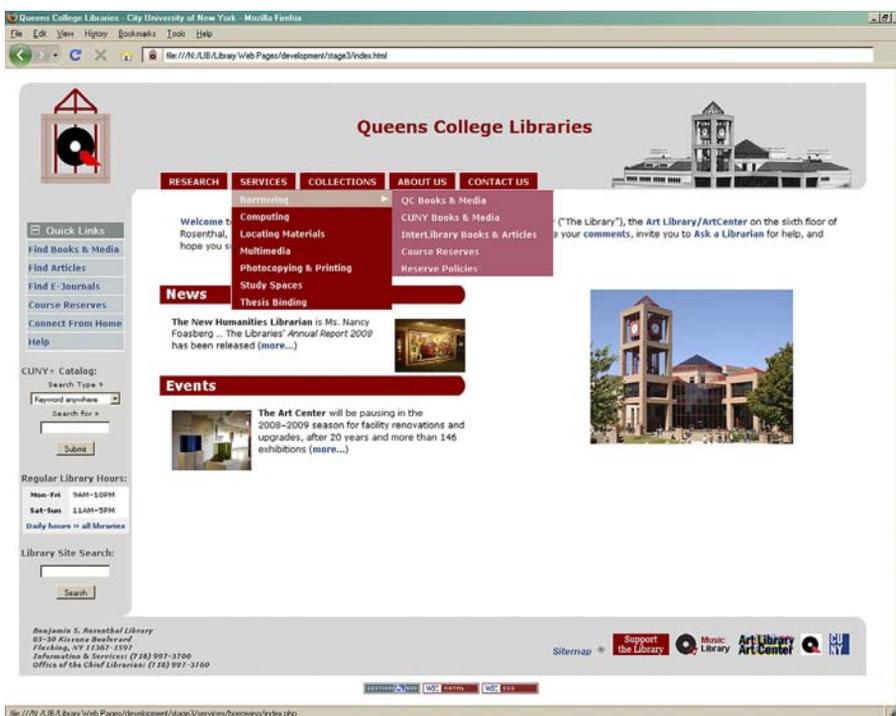


Figure 6. New web site, borrowing submenu

red color commonly used on the college web site was retained. After several initial designs, the groups agreed fairly quickly on one of them for the structure, and the team tweaked it and the combination of colors until the design came together. This was the skeleton the team built upon as they tackled the navigational structure.

Even if a user understood what Services meant, it was crucial for them to be able to navigate successfully to the information they sought. The collective experience of the QCL librarians had taught them the need for an easy navigational flow that would ensure a user could not get lost when browsing. Keeping content elements inline as a rule would achieve such an outcome. Categories in the primary areas displayed in a sidebar menu when a user initially selected a link so the other navigational options would be clearly available. For instance, mousing over Research to select Search Engines would situate the user on the Search Engines document. The sidebar would indicate this entry in a color distinct from the other categories in Research. Therefore, the user would know his current place (Search Engines), would see the other categories within research in the sidebar (Ask a Librarian, etc.), and would have access back Home to the main index, or to other areas on the top navigation menu (Services, etc.) (Figure 7). With such a navigational flow, the team built the user support structure for browsing and independent learning the library needed.

The main index also served as an enhanced information portal for library users. Discrete spaces were set aside for tools, services, and information that could meet a user need immediately. For instance, a place was made in the main content area for small versions of current News and Events where lead-in text could be written related

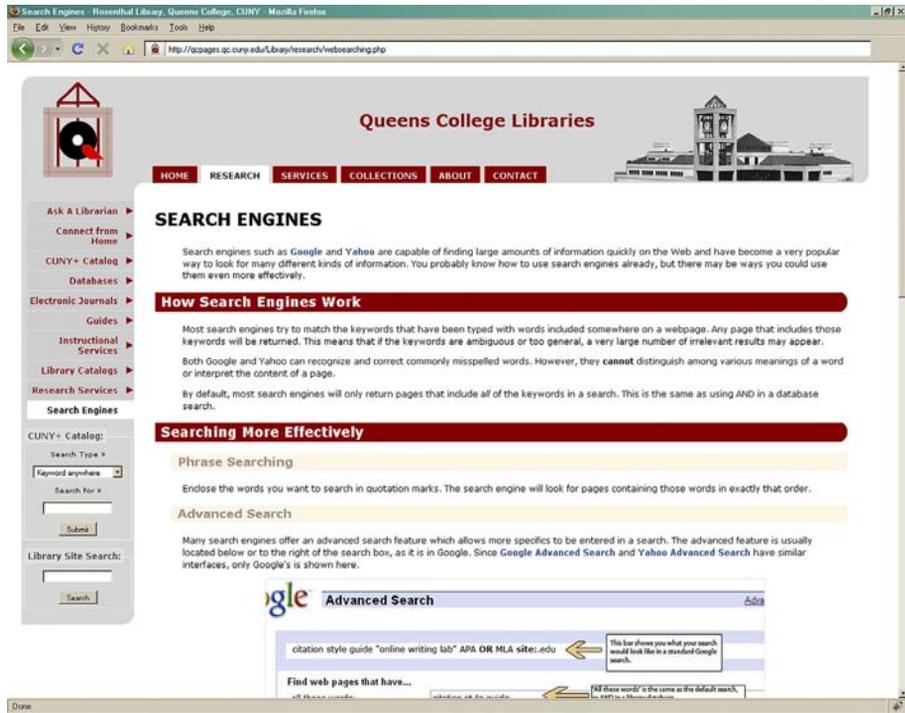


Figure 7.
New web site,
research/search engines

to fuller messages on internal pages. In the sidebar, a small table to display the regular library hours was created, with a link to a full Hours page. Also situated there was a Quick Links table, an embedded Catalog search, and a Library Site Search (Google Custom Search Engine). Lastly, the library needed a somewhat larger content space for images (300 × 200 pixels) to give the web site more personality and identity. More visual imagery of people and places were included by using existing photographs that had been taken by the college photographer for an earlier project.

The web team designed the layout to be device- and platform-neutral so the QCL site appears the same regardless of the web browser (IE, Firefox, Safari, and Opera) and operating system (MS-Windows, Mac OSX, and UNIX). A fluid layout for positioning content within the browser was created, optimized for a display of 1,024 × 768 screen pixels but dynamically resizable for monitors with different ratios. This approach has increased the site's accessibility by creating well-formed documents that display consistently across devices and platforms. Formatting instructions reside in a separate CSS file to help ensure that users requiring assistive technologies can access the information quickly. Where possible, the application of Web Accessibility Initiative (WAI) and US Section 508 Rehabilitation Act guidelines occurred to further enhance access by the disabled.

Available technology and technical skills

The web team wrote every page according to W3C standards, specifically XHTML version 1. This ensures that the pages are interpreted properly by all browsers and the

documents are transformed into additional formats as needed. To achieve proper interpretation of all text characters within the documents, the UTF-8 variant of the Unicode character encoding scheme was used, which is also a requirement for conformant XML documents.

The visual presentation of the site occurred through CSS version 2.1, in keeping with the principle of separating document content from formatting. This has allowed the design to be modified at any time through a central style sheet, with changes being reflected throughout the site. Correspondingly, the HTML elements used to mark up document content have been applied semantically, so that headings, lists, paragraphs, and tables clearly reflect the choice of containing tags.

Six style sheets define the layout and appearance of the site content. One common style sheet was created for use throughout the web site. Another retains the original appearance of some legacy borrowing documents, while a third compensates for the CSS deficiencies of internet Explorer 6 and below. In addition, an alternative targeted media style sheet exists for documents that require reformatting for paper printing, as well as a style sheet specifically for pages containing online forms, and one applied to the calendar tables displayed in hours. Where possible the styles, identifiers and classes were semantically named to indicate the type of content they apply to.

This level of best-practices compliance made the task more exacting by adding an inherent period of testing before implementation. This slowed construction but ensured a strong foundation. By allowing time for testing and review the team were able to adjust some decisions to meet unanticipated technological imperatives, with only minor adjustments made from one stage to the next.

By the end of July 2008 only two pages were still under construction, Hours and Maps. Despite misgivings about not having every piece completed, the site had been tested rigorously and was functional. Library service concerns helped dictate the timing of the new release. The benefits that could accrue to QCL users by allowing the uncompleted, yet functional, work to be released were paramount. Users and librarians would need the four weeks before the start of the fall to adjust, so QCL released its new web site in static HTML format on July 31.

Operability and features in JavaScript and PHP

The web team adopted the technique of “graceful degradation” so dynamic features would not impede the ability to access information. Where a script was written to make sorting a table easier, the table’s content would still be available to a user who did not have such scripting. This approach toward “progressive enhancement” allows users to access the site’s basic content and functionality through any browser or internet connection, while also providing those with better bandwidth or a more advanced browser an enhanced version[3].

Since QCL does not host its own server the team programmed in languages that work across user platforms and operating systems: JavaScript for the client-side features, and PHP for the server-side ones. They wrote five programs in JavaScript for the interactive features and for the Hours and Maps pages, and two in PHP for the Ask a Librarian and Comments forms.

Interactivity. The team created the client-side scripts to enhance the features of certain documents by making the content easier to comprehend. For instance, there is a primary script containing common functions used throughout the site: to allow for

multiple page loading events, to open a popup window, to provide the dropdown menu, and to perform a basic catalog search. A second script was designed to filter the content of tables, so documents such as databases (figure 8) and faculty and staff directory can reveal and conceal elements to facilitate sorting or searching. Librarians had long wanted this feature, so databases or directory (Figure 9) could be sorted by subject/department as well as alphabetically by name.

A third script provided the asynchronous loading of contact information from the directory. This allows the user to remain on the document already being displayed (e.g. Subject Specialists) (Figure 10) but to reach out and grab the e-mail address and phone number of someone who can assist them, displaying it on the same document. A similar sleight of hand effect appeared in a fourth script that dynamically reveals and conceals sections of a single document listed in a sidebar submenu. The user can view different sections of a page by clicking on the appropriate links, swapping one section for another so the discrete display of content is maintained throughout the experience. All the content resides in one file for easy management and the user is unencumbered by a long page-scrolling experience.

Forms. The fifth script validates an online form, while two PHP scripts implement further validation of the Comments and Ask a Librarian forms because client-side validation alone provides insufficient protection for servers. These scripts also redirect form users to an error or acknowledgement page based on their submission, providing customized feedback unavailable through a stateless client-side approach.

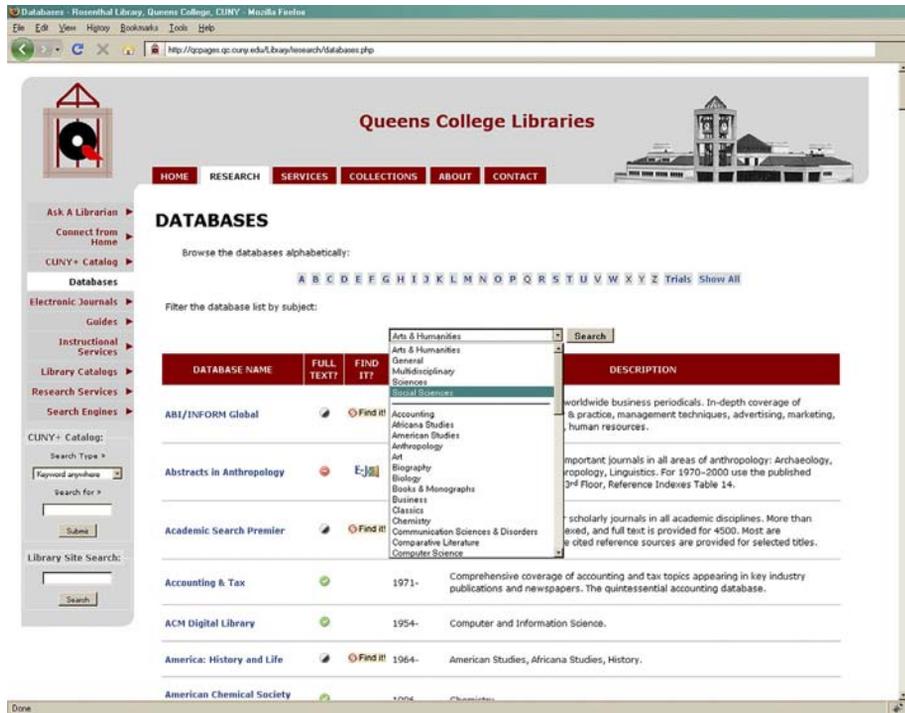


Figure 8.
New web site, databases
with sorting

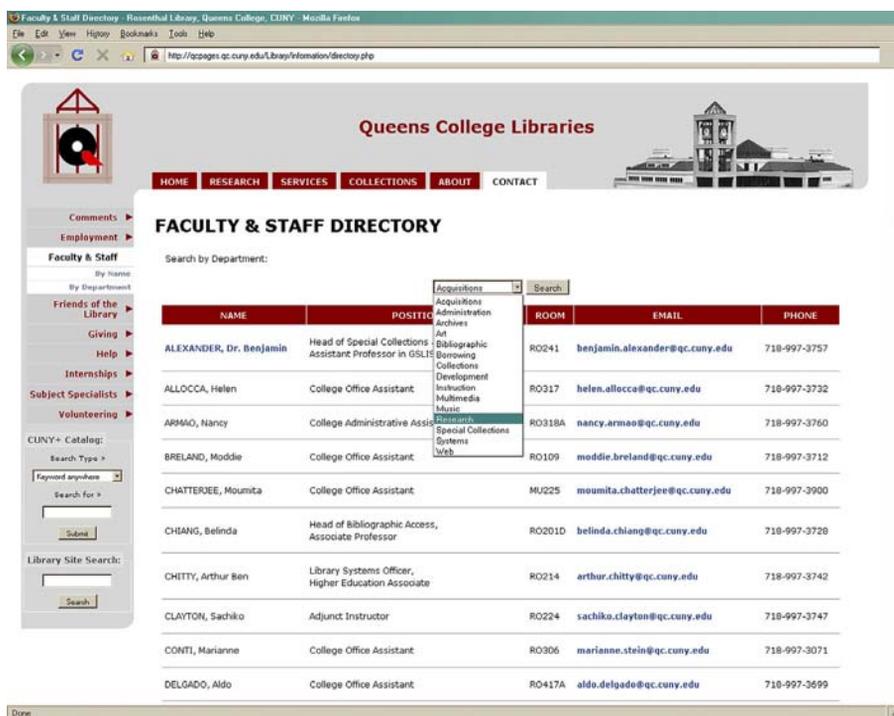


Figure 9.
New web site,
directory, sorting and
contact information

Hours. Documents like the calendar, Hours (Figure 11), required a more specialized approach. Since the QCL web site often serves as the gateway for multiple QC library constituencies, the hours of all of them had to be represented: Rosenthal Library (“The Library”), the Reading Room, the Art Library, and the Music Library. To make Rosenthal’s the default table and access to the other three easily available, the team designed a side sub-menu to reveal a list of the different libraries, and to dynamically conceal the calendars for all but Rosenthal.

Each library’s calendar has been designed as a complete HTML table document, with a custom style sheet to present the table in a traditional format. The current calendars are added to the Hours page through inline frames, a method of displaying one web page within another. If a browser is unable to display the frame content, text indicating a link directly to the table is presented. Links in the first row of each table navigate to the preceding and following months, which are displayed in the main page without reloading the document.

Maps. A page with maps of Rosenthal’s layout was an essential service to provide for visitors to QCL. The Maps page (Figure 12) reused existing floor plan images that were on file. Anticipating a building renovation in the next few years the maps page was designed so the text, imagery, or interactivity could be modified easily. Avoiding the use of third-party browser plug-ins or proprietary formats, the team created dynamic maps using JavaScript and layered transparent graphics. Each floor of the library was placed within a division containing the actual floor-plan as a background image. On top of this, the section was divided into an ordered list on the left and a transparent graphic of callout

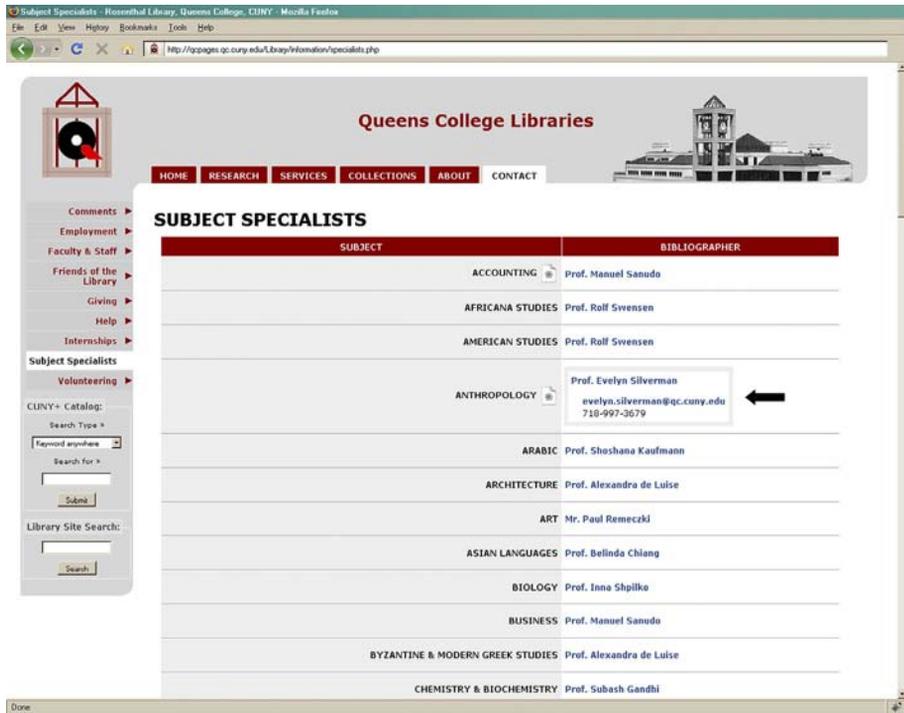


Figure 10.
New web site, subject
specialists, data retrieval
from directory

numbers corresponding to locations on that floor. An image map attached to each graphic describes the “hotspots” representing those locations.

The script responds to mouse hovering events. When the mouse enters a hot spot on the map the corresponding numbered list item changes color to increase its visibility.

When a numbered list item is hovered, the transparent graphic above the background map is replaced by a new graphic that contains the appropriate callout to provide a clear indication of its building location. A graphical HTML editor (e.g. Adobe Dreamweaver) can be used to create or modify the image map hotspots, and an image manipulation program can create new transparent GIF overlay graphics. Although using a dedicated animation tool like Adobe/Macromedia Flash might have been quicker, this JavaScript approach allows the maps to remain useful where plug-ins are unavailable.

Structure. At the end of January 2009, the web team finished the PHP programming for the structural foundation of the web site. Several structural components are common to almost every document, such as the page “footers.” Other elements appear in multiple locations based on the requirements of a document, like the “guide box” at the bottom of subject guide pages, or the secondary menus listing documents within a directory. The team created structural templates in PHP for these components and elements. When requested from the web server, the components are dynamically added using the PHP interpreter. They are stored in a common directory to allow for modifications to the site structure in one location. Creating new documents requires only that the appropriate components be referenced in the correct location on a page using the PHP include () directive.

The screenshot shows the Queens College Libraries website. At the top, there is a navigation menu with links for HOME, RESEARCH, SERVICES, COLLECTIONS, ABOUT, and CONTACT. Below this is the "LIBRARY CALENDARS" section, specifically "Rosenthal Library Hours". A calendar for June 2009 is displayed, showing service hours for each day. The calendar table is as follows:

May	JUNE 2009						July
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	
	8am-9pm	8am-9pm	8am-9pm	8am-9pm	8am-5pm	CLOSED	
CLOSED	8am-9pm	8am-9pm	8am-9pm	8am-9pm	8am-5pm	CLOSED	
CLOSED	8am-9pm	8am-9pm	8am-9pm	8am-9pm	8am-5pm	CLOSED	
CLOSED	8am-9pm	8am-9pm	8am-9pm	9am-5pm	CLOSED	CLOSED	
CLOSED	8am-9pm	8am-9pm					

Below the calendar, there are sections for "Service Hours:" and "Circulation/Reserve Desk:". The sidebar on the left includes a search tool and a "Library Site Search" field.

Figure 11.
New web site, hours,
default display
with submenu

Overall, more than a dozen template documents exist: two each for the five functional areas of the site, one each for Borrowing and Instruction which have a unique sidebar for their subsections, two scripts for the common footer and for the research guide box navigation menu, and two scripts for the search tools in all sidebars and for the automatic messages on the forms. In sum, a typical document in the Services directory contains references to three scripts: one for the main navigation menu, one for the sidebar (which itself might reference the search tool script), and at the bottom of the page a reference to the footer. In this way, the structure is parsed in a manageable way so updates to different structural components can be done to a single file but applied globally to each affected document[4].

7. Stage three: evaluate and improve

Ongoing assessment of a web site is vital to its health. Without enough time for a user survey, the web team created a public services staff survey in December 2008 to receive quick input on staff use of the web site when assisting users. After using the web site for a semester it was important to learn about users' experiences, albeit secondhand. Over the winter break minor adjustments could be made.

Removing the home link from the "clock tower logo" the team made a Home link for the top navigation menu for all pages except the main index. The "clock tower logo" was modified to link to the main content area for easy accessibility by assistive technology users. The Quick Links were previously six in number (Find Books and Media, Find Articles, Find E-Journals, Course Reserves, Connect from Home, Help). The more

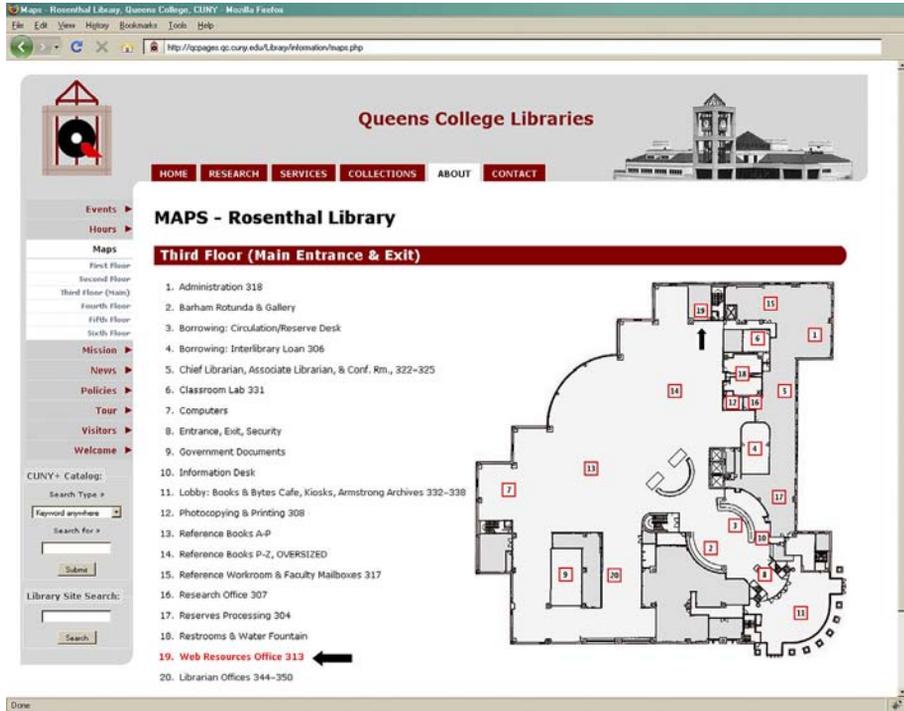


Figure 12.
New web site, maps, with
number 19 visible in list

commonly-used phrase Ask a Librarian replaced Help. A link for Find Databases was added because some users who were routinely told by faculty to use “databases” to find articles were unsure if Find Articles would take them to “databases.” The team also added Borrow Books, etc. because it was not intuitive to some users who needed to borrow, renew, or request material that Services would take them to Borrowing. The total of eight quick links were now split into two alphabetical groups of four, and placed in a redesigned table for easier recognition. The Quick Links had previously been resident in each document but now it was placed only on the main index. The small table for standard hours was also redesigned to be more attractive, and was moved from the sidebar menu on every document and placed only on the main index, beneath the library photograph. To give users more visual variety on the front page, the team wrote a script to randomly select one of seven photographs of the Rosenthal Library. Such a seemingly minor change in imagery allows the main index to look fresh when the News and Events content remain the same for days (Figure 13).

8. Transition to the future

During the Spring and Summer 2009, the web team kept the site current by processing updates, and documented the redesign project, which included numerous recommendations for future web development at QCL; hopefully, the successor web team will have the opportunity to improve the web site. Since the project concluded this summer, the QCL web site design has already been re-factored to appear more like the

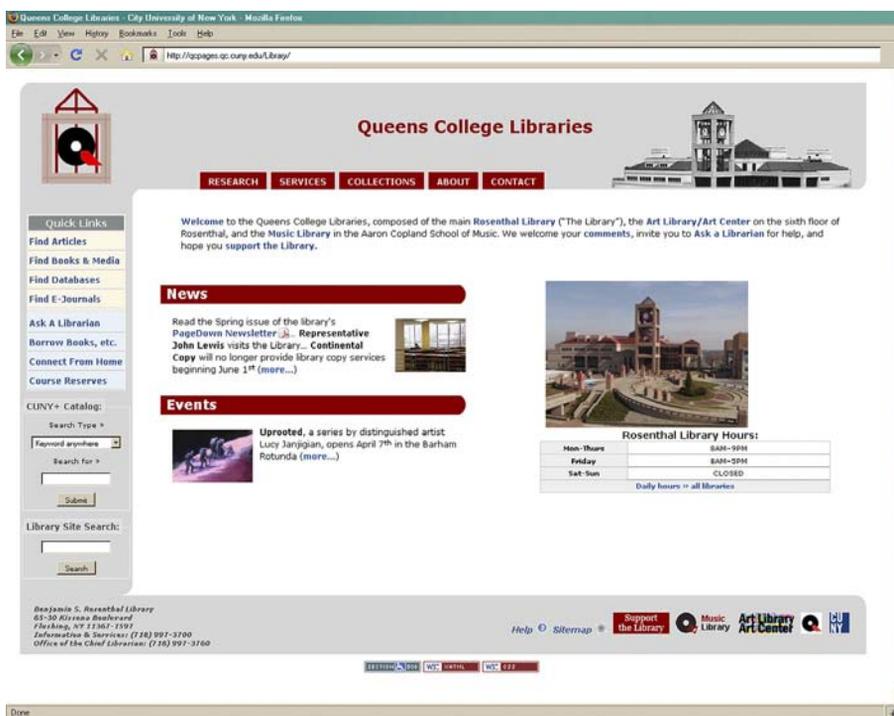


Figure 13.
New web site, front page
after survey and
improvements

Note: February-August 2009

newly-designed QC web site. The college intends to phase out the web server which hosts departmental web sites, like that of QCL. It plans to institute a college-wide content management system to administer all QC's web sites which do not run on their own departmental servers. To improve QCL web services, the library ought to enhance its independence by purchasing the hardware to operate its own dedicated web server, as well as a relational database management system server. These will be necessary for the installation of systems for library-centralized content management, for version and revision control, and for locally hosted research and instruction Wikis. Fortunately, the best-of-breed applications for these purposes are all currently free and open source software and are well-documented and easy to configure.

To be certain about the effectiveness of the QCL web site, monitoring and analysis of its use will be needed. There are many free simple tools for generating web site statistics from web server logs, which reveal the number of visitors, their internet addresses, the pages they view, their point of entry, and time spent on the site. Analyzing such data to make improvements can enhance the design of the QCL web site. Since the site is the platform through which librarians communicate with, instruct, and serve their users, the best way to ensure quality is to invest in dedicated professional personnel to oversee the specialties involved in web development. With these basic steps QCL can build a web technology infrastructure to continue extending its vital services into the virtual world.

9. Conclusion

Applying their best practices in web management the web team created an open and inclusive process involving every librarian in what became a library-wide collaboration through which sustainable decisions took place. Applying their best practices in web design, the team made good use of available technology and technical skills. Less concerned with bells and whistles, QCL did not buy into cultural expectations that its web site look like a commercial product, so the team created a web site for an academic library not a business. Although this experience shows that doing more with less is not really possible, QCL discovered that doing what it needs to do may be possible.

The can-do maxim attributed to Theodore Roosevelt guided the web redesign project: “do what you can, with what you have, where you are.” Armed with a good text editor, the web team created an easy-to-use web site built with an intelligible information architecture upon public web standards. The team members combined their skills to accomplish the redesign: one was learned in librarianship but learning web technology, the other was learned in web technology but learning librarianship. No doubt a web librarian who combined learned librarianship and web technology in one person could have achieved the same result, but QCL did not have that person at that time. Adopting best practices helped make the QCL web site an example of how a mid-sized academic library “with less” can still accomplish the web work it needs to.

Notes

1. To ensure QCL's web work met current web standards the web team made constant use of The W3C Markup Validation Service, available at: <http://validator.w3.org/>, The W3C CSS Validation Service, available at: <http://jigsaw.w3.org/css-validator/>, and the O'Reilly guides in general. Two which provide sound overviews to web science are Musciano and Kennedy (2007) and Robbins (2006). For information architecture the work by Morville and Rosenfeld (2007) was also helpful.
2. The authors thank Professors Noel Agnew, Nancy Foasberg, Michael J. Miller, Dr Jennifer Oates, Inna Shpilko, and Izabella Taler for their valuable participation in the web groups which helped revise the original web site and create the new one. Thanks are extended to Dr Rolf Swensen for coordinating the original web site efforts for many years, and to the library systems department for their work in managing the original web site with him, and for supporting the new web setup and operation: Arthur Ben Chitty, David Samuels, and Rudy Manalac. The support Dr Robert A. Shaddy provided for the new web effort is much appreciated by the authors, as is the collective input the rest of the QCL librarians provided during this process. The QCL web site is located at: <http://qcpages.qc.cuny.edu/Library>
3. The team made use of the excellent guide by Keith (2005).
4. For help with PHP, Lerdoff *et al.* (2006) were consulted.

References

- Bordac, S. and Rainwater, J. (2008), “User-centered design in practice: the Brown University experience”, *Journal of Web Librarianship*, Vol. 2 Nos 2-3, pp. 109-38.
- Felker, K. and Chung, S.K. (2005), “If at first you don't succeed . . .’: website redesign at the UNLV libraries”, *Library Hi-Tech*, Vol. 23 No. 1, pp. 50-65.
- Fox, R. (2008), “Weaving the digital library web”, *OCLC Systems & Services*, Vol. 24 No. 1, pp. 8-17.

-
- Fuller, D.M. and Hinegardner, P.G. (2001), "Ensuring quality website redesign: the University of Maryland's experience", *Bulletin of the Medical Library Association*, Vol. 89 No. 4, pp. 339-45.
- Garber, G. and Hooper, M. (2009), "Redesign for success: developing a student centered website", *Tennessee Libraries*, Vol. 57 No. 2, available at: www.tnla.org/associations/5700/files/garber.pdf (accessed 13 October 2009).
- Keith, J. (2005), *DOM Scripting: Web Design with JavaScript and the Document Object Model*, Friends of ED, Berkeley, CA.
- Lerdoff, R., Tatroe, K. and MacIntyre, P. (2006), *Programming PHP*, 2nd ed., O'Reilly, Sebastopol, CA.
- McHale, N. (2008), "Toward a user-centered academic library home page", *Journal of Web Librarianship*, Vol. 2 Nos 2-3, pp. 139-76.
- Morville, P. and Rosenfeld, L. (2007), *Information Architecture for the World Wide Web*, 3rd ed., O'Reilly, Sebastopol, CA.
- Musciano, C. and Kennedy, B. (2007), *HTML and XHTML: The Definitive Guide*, 6th ed., O'Reilly, Sebastopol, CA.
- Nielsen, J. (1997), "Web design vs. GUI design", available at: www.useit.com/alertbox/9705a.html (accessed 17 October 2009).
- Oldham, B.W. (2008), "Focus groups and usability testing in redesigning an academic library's website", *Journal of Web Librarianship*, Vol. 2 Nos 2/3, pp. 219-46.
- Raward, R. (2001), "Academic library website design principles: development of a checklist", *Australian Academic and Research Libraries*, Vol. 32 No. 2, pp. 123-36.
- Riley-Huff, D.A. (2007), "Renovating the library website: a case study", *Mississippi Libraries*, Vol. 71 No. 1, pp. 16-19.
- Robbins, J.N. (2006), *Web Design in a Nutshell: A Desktop Quick Reference*, 3th ed., O'Reilly, Sebastopol, CA.
- Robbins, L.P., Esposito, L., Kretz, C. and Aloj, M. (2007), "What a user wants: redesigning a library's website based on a card-sort analysis", *Journal of Web Librarianship*, Vol. 1 No. 4, pp. 3-27.
- Vaughan, J.B. (2001), "Three iterations of an academic library website", *Information Technology and Libraries*, Vol. 20 No. 2, pp. 81-92.
- Ward, J.L. (2006), "Website redesign: the University of Washington Libraries experience", *OCLC Systems & Services*, Vol. 22 No. 3, pp. 207-16.

About the authors

James T. Mellone is a Social Sciences Librarian at the QCL, CUNY, where until recently he also served as the Coordinator of Web Resources. He holds an MLS degree from the University at Albany, and an MA in History from Binghamton University. His previous library experience includes working as Reference-Interlibrary Loan Librarian at Hofstra University, and Head of Interlibrary Loan at Binghamton University. James T. Mellone is the corresponding author and can be contacted at: james.mellone@qc.cuny.edu

David J. Williams is a Web Developer with Language Services, Inc. and the Web Resources Technician at the QCL, CUNY. He holds an MLS degree from the Queens College Graduate School of Library and Information Studies and a BS in Information Systems from the Drexel University College of Information Science.