

Evidence-Based Practice to Enhance Library Web Site Usability: An Implementation Case Study at Northwestern University Library

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This paper examines the introduction of evidence-based practice within the Web Advisory Group at the Northwestern University Library. As a case study, the focus of this paper is on implementation of research into practice by focusing on two of the core elements identified by Kitson, Harvey, and McCormack (1998): context and environment and method of facilitation. Through this examination, some implications are developed for the potential role of evidence-based practice in academic library web site design and academic library management in general.

OBJECTIVE: In many libraries, web site design is informed more by opinion rather than evidence. A critical question for libraries then is how to move from an opinion-based design process to one that is based on sound principles of evidence-based practice.

METHOD: Following an examination of the background of evidence-based practice and its potential applicability to website design and implementation processes, the study explores the application of evidence-based practice in one particular setting: a large ARL library serving a diverse population of approximately 25,000 users.

RESULTS: While implementation of evidence-based practice within the target environment has occurred, the implementation pathway has not been without problems and challenges. Resolving these challenges will be a test of the long-term effectiveness of evidence-based practice in an academic library setting.

CONCLUSIONS: Using evidence-based practice in website design can make a significant difference in the effectiveness of the website design process. By evaluating the outcomes of the implementation within the web design group, some conclusions on engaging staff throughout the library in evidence-based practice have been developed.

Introduction

As is the case with most things in life, academic library web site development is an intricate mix of many variables. In particular, web development represents a complex intersection between technology and design with its fundamental base rooted strongly in principles derived from human-computer interaction theory and practice (McCracken & Wolfe, 2004; Nielsen, 2000).

In academic libraries, website development is overwhelmingly assigned to people who have been formally trained as librarians (Evans, 1999). However, the majority of academic librarians who are performing this function have never received either formal or information training related to web site design (Hendricks, 2007). The implication of this is that they design websites based on knowledge derived primarily from experience in library and information science, yet the need for multidisciplinary talents and skills to create an effective web presence is clear (van der Walt & van Brakel, 2000).

Broad understanding of the complex issues in web site design is particularly critical for academic libraries given the wide variety of patrons in the academic environment (Raward, 2001). This is further complication by the significantly different expectations people generally have related to on-line as opposed to in-person service and product delivery experiences (Zeithaml, Parasuraman, & Malhotra, 2002). An example of this difference in expectations is the delicate balancing act service organizations must perform between marketing of their services and adding value of the services they perform. In the in-person environment, a substantial portion of the effort in providing a service is typically dedicated more to marketing and awareness whereas in the on-line environment, this relationship is reversed. The majority of effort related to a service in the on-line environment needs to be spent not on marketing and awareness, but instead on “creating a great customer experience” (Stepanek, 1999, p. EB30) that is self-evidently better than any other competing service.

This issue of clarifying the difference between delivery of in-person and remote services is an especially important one for academic libraries as we see this same tension in academic library websites. A great degree of academic library web design has been influenced by anecdotal evidence and opinion on what is best for the patron. Given the prevalence of anecdotal

evidence in library outcome assessments (Poll, 2003) this approach should not be too surprising, but it is problematic. It is known that certain design metrics can increase the effectiveness of a web site (Ivory, Sinha, & Hearst, 2001), but there has been no active movement to develop guidelines or rigorous evaluative methods (Raward, 2001) for academic library websites. As a result, academic library web sites are often difficult to use because they are too centered on the internal structure of the library rather than taking into account the way people search for information (McGillis & Toms, 2001)

The ramifications of this are significant. Organizations that depend on the public to achieve their mission need to employ dialogic features into their website design to better enable access to the information people need (Kent, Taylor, & White, 2003). A website must be challenging, competitive, and provide feedback to its users (Geirland, 1996) in order to encourage the occurrence of *flow* – a state of being where the person is completely immersed and engaged with what they are doing, because it is through this state change we develop feelings of success, involvement and focus (Csikszentmihalyi, 1990, 2003).

Consequently, design criteria for web services should focus on what it is that users are actually trying to do and where they are trying to go within the site (Hsiang Chen, T., & Nilan, 1999) rather than focus on or enforce what a web service implementer thinks is important. If designers focus more on internal concerns of users and less on the external nature and context of the environment, more useful and usable activities will emerge on the Web.

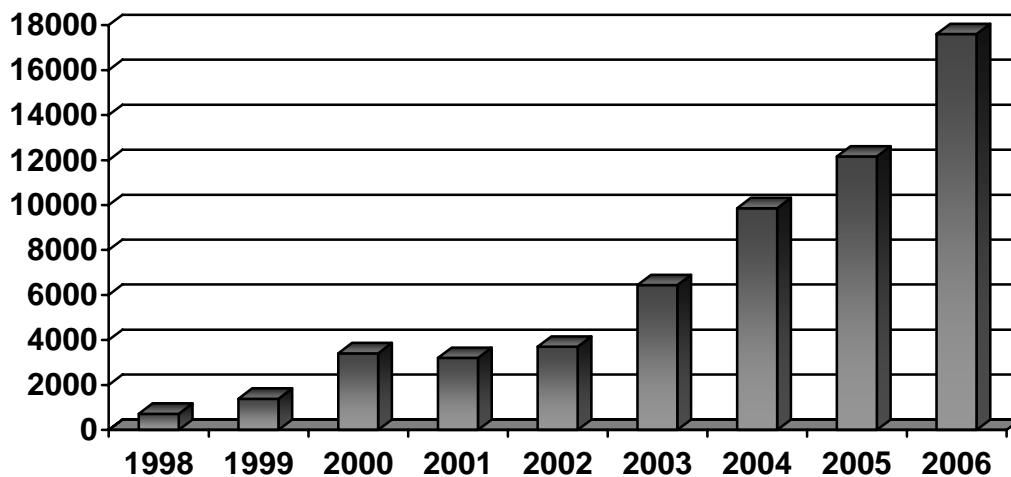
Context and Environment

With a student body of approximately 18,000, Northwestern University has two main campuses: one in the city of Chicago and the other in the immediately adjoining suburb of Evanston. The University Library, with locations on both campuses, holds over 4.6 million volumes and is one of the largest research university libraries in the United States. World renown for its collections related to Africana, Transportation, and 20th century Music, the University Library also serves a broad, worldwide constituency that extends far beyond the boundaries of either campus.

As has been the case in most academic libraries, the importance of web-based services and material delivery has been growing rapidly. With an ever increasing volume of scholarly

material being made available online, use of this material has increased steadily. One example is that in the eight year period from January 1998 to January 2006, monthly downloads of full-text articles from the JSTOR collection of materials has increased over 2300% (Figure 1). Even when analysis is limited to the most recent time period for which statistics are available (January 2005 to January 2006), the number of article downloads per month has increased almost 45% in a single year.

Figure 1 - JSTOR article downloads per month



While increases of this nature are unlikely to continue indefinitely, it is as a result of the rapid increase in use that the importance of evaluation in relationship to web-based services began to emerge as a critical issue. It was within this environment that the University Library first began to move toward evidence-based practice.

First steps in moving toward evidence-based practice

However, in a process similar to what Glynn (2006) has described, the introduction of evidence-based practice was not an intentional act but rather an evolutionary process. The members of the library's Web Advisory Group in the course of their work eventually found themselves using evidence-based practices, primarily derived from user-centered design principles, without even realizing it.

The evolution of evidence-based practice within the library began in 2001 with the first usability test of a web-based service. At the time, there was no group that was formally charged with investigating and addressing issues related to the design of web-based services. Consequently, design of services was not informed, in an organized manner, by user needs. Anecdotal evidence from reference department staff indicated that there were significant problems with the library’s “Electronic Resource Finder,” an application that provided a mechanism for people to locate online databases provided by the library. As seen in Figure 2, the page violated several best practices in webpage design that were well-known at the time (Mullet & Sano 1995; Nielsen, 1997) including a “fluff” material that does not directly address the searchers need, a heavily reliance on explanations of items rather than make them self-evident, and a non-intuitive page organization.

Figure 2 - “Electronic Resource Finder” introductory page circa 2001.



Using anecdotal evidence as a starting point, a group was appointed to investigate the issues identified by staff and patrons as problems in the “Electronic Resource Finder.”

Evidence-Based Practice to Enhance Library Web Site Usability: An Implementation Case Study at Northwestern University Library

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Consisting of representatives from various areas throughout the Library, the group took on the task of redesigning the electronic resource finder.

From an evidence-based perspective, the work of this group lacked some critical components. Rather than perform usability tests, information was gathered from a survey; however the sample population was not randomized nor were any controls put into place to ensure that it was representative. Furthermore, there was no subsequent research on outcomes to validate whether the changes put into place were effective in addressing the issues that had been identified.

Nonetheless, as a first step, the work of the group provided both a model for organization of subsequent efforts as well as a learning experience that whetted people's appetite for more extensive usability testing.

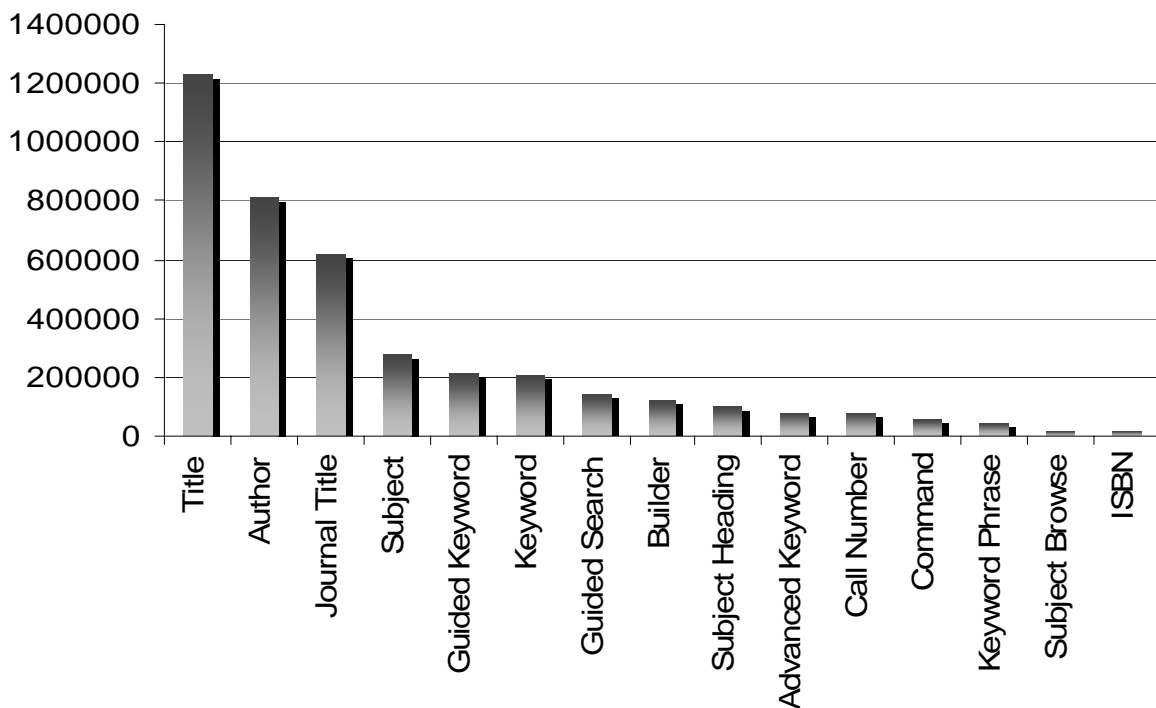
From this beginning, in the summer of 2002, work was initiated to investigate how people were using the online library catalog. As was the case previously, the initial impetus for investigation was driven by anecdotes from reference staff who felt it was clear that students were having problems using the catalog, but it was not clear exactly what the problems were. Staff wanted to know if there were discernable patterns in how people were using the catalog and, in particular, if there were distinct patterns in the types of errors people were making when using the catalog.

With this as a launching point, the investigation focused on usage patterns within the catalog. Based upon grounded theory (Glaser & Strauss, 1967), the research team used data mining techniques (Han & Kamber, 2001) to uncover patterns within the search logs of the system. This process was particularly informative as it provided information about how people were actually using the system free from the bias of interpretation that might arise in a traditional, observational study.

Information in the logs had been gathered over a 16-month period and contained 4.5 million separate search queries. What was especially interesting to the team, however, were the over 1.6 million (37%) of the searches that did not result in any item being found. While returning no results is not necessarily an error, the research group felt that these records would be of particular interest as a search that results in no hits is probably not a desired outcome.

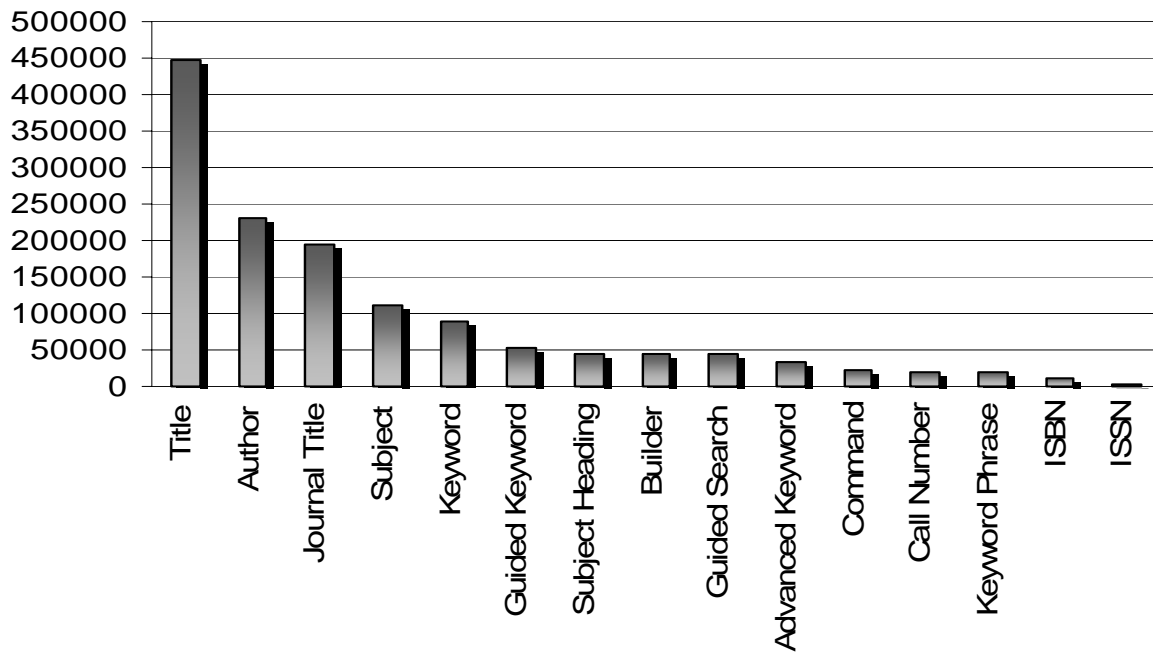
Looking more deeply into the data, the team discovered some distinct trends in how the system was being used. As can be seen in Figure 3, the majority of searches that had been performed were exact title searches. This seemed odd to the team given what they knew about how people tend to search (Larson, 1991). The answer to this paradox was readily apparent when it was determined that the default search type in the catalog interface was an exact title search. Subsequent analysis revealed another interesting fact: that the search type most frequently resulting in no results was also an exact title search (Figure 4).

Figure 3 – Number of searches by type in the library catalog



Armed with this information, the underlying issue began to emerge. Delving into the data related to these failed searches, it quickly became evident that that the majority of failed searches were the result of not changing the default selection of search type to the proper type of search being conducted. That is, the exact title searches were failing because the terms being used were actually keywords or keyword phrases that had no relation to a monographic or journal title.

Figure 4 – Number of searches by type with no results found in the library catalog



Following up on this finding, the research team began to investigate what types of searches were the most successful based on the premise that search types consistently resulting in a non-null result set are more acceptable to the user than search types that consistently result in a large proportion of null result sets. When viewed from this perspective, guided search (a specialized form of keyword search in the Voyager library management system) was the most successful search type observed in the search logs, as more than 75% of all guided searches return a non-null result set.

Using this and other empirically-derived results, changes were made to the online catalog. As the majority of searches that are performed in the catalog are the system default search type regardless of what it is, the most significant adjustment made was altering the default search type from exact title search to keyword. After this change, the proportion of successful searches (that is, non-null result sets) in the catalog has improved. Additionally, there has been a decrease in the number of complaints to reference staff that the catalog is difficult to use. Unfortunately, exact statistics on this have not been kept, so it is not possible to accurately gauge the total impact of the changes.

Instituting evidence-based practice

While these changes were being made, the library began conducting a series of focus groups to better understand what communication vehicles faculty and students preferred for learning about new library services and resources. These focus groups were held as an outgrowth of a charge the administrative team had given to the Director of Public Relations to develop a new visual identity for all library print communications. An objective of this project was to ensure consistency in communications from the library as well as establish a more polished and professional look in all communications.

In the focus groups, several participants offered unsolicited comments about the library website, most of which made it clear that the existing site did not work especially well for various user communities. Both students and faculty expressed frustration with the web site both in its overall look and feel as well as in respect to their ability to successfully navigate through the site.

The combination of these factors led to a decision to redesign the library's web site. However, unlike previous redesigns, the process was entered into with the understanding that user-centered design principles would be used (McCracken & Wolfe, 2004; Vredenburg, Isensee, & Righi, 2002). Thus, the process began with a clearly articulated goal of revising the site specifically to meet the needs of students and faculty. Important to this effort was the recognition that people approach the site with many different needs and desired modes of interaction. For example, it was clear from analysis of website log files that most patrons do not physically visit the library to use the website. In addition, it was clear from the aforementioned focus groups that students using the website did not want "instruction" on search strategies or how to use resources. They simply wanted to find the materials they needed to write their class papers and perform their research projects.

Consequently, a concerted effort was made to gather information from faculty and students through a combination of techniques including focus groups and online surveys. Using the observations of librarians as a launching point for developing questions related to website usage, several problem areas were identified including:

- Confusing explanations of library hours at the various locations,
- A lack of specific information about collections, and

Evidence-Based Practice to Enhance Library Web Site Usability: An Implementation Case Study at Northwestern University Library

- Difficulty finding electronic resources.

Realizing that addressing these issues would be a complex and resource intensive endeavor, the Assistant University Librarian for Information Technology (AULIT) was charged by the University Librarian with restructuring the entire web development process as well. An integral part of that restructuring was a desire on the part of the AULIT to bring a more user-centered and justifiable methodology to the web site service and resource delivery decision making process. Understanding that, as Booth (2006) has noted, evidence-based practice does not materialize by itself, a deliberate process was embarked upon to foster an environment that would welcome evidence-based practice.

The process was put into place based on three principles:

1. An excellent website is not a ‘one-off’ affair; it requires constant revision and adaptation,
2. The design and delivery of services must be informed by best practices and rigorous evidence drawn from principle of both librarianship and human-computer interaction, and
3. Website development is a library-wide affair, not simply the domain of a select few.

To put these principles into place, it was necessary to create a self-perpetuating cadre of people with well-developed web design skills. This process was started by forming the Web Advisory Group. To ensure representation from all areas of the library, group members were selected to include staff, some of whom are not librarians by training, from reference/instruction, collection management, branch libraries, technical services, public relations, and information technology. As members cycle off, they are expected to be “ambassadors,” primarily working within their department to foster better understanding of issues related to usability.

People who are selected for appointment to the group must go through an induction process that consists of required readings and training activities. The required reading list initially focused exclusively on materials related to user-centered design and testing methodologies, but was expanded to include general readings about evidence-based practice.

The cornerstone of the plan, however, is the combination of mandatory training for all incoming members of the group and the development of standards for practice. When members accept an appointment to the committee, they also agree to undergo training in techniques related

to usability testing. This training includes practical experience in designing, testing, and conducting usability tests as well as exposure to best practices in evidence gathering and evaluation.

The final component in the process is a program of continuous standard development and ongoing assessment and reevaluation. All components of the library's web site are expected to conform to the common practices and standards defined in the library's web style guide, which is based on best practices in web design and human-computer interaction. When recommendations from a usability study are put into practice, the effectiveness of the recommendation implementation is assessed as part of the design of the next usability study performed. Additionally, the program itself is periodically reviewed to incorporate new research and evidence.

Current status and issues for further consideration

Overall, the program has had its successes. A demonstrable outcome is that site usability has improved. This has been demonstrated by subsequent testing as well as statistical measures related to usage patterns. Both of these have shown that people are able to find resources more quickly and easily today than they were able to two years ago.

Furthermore, knowledge of evidence-based practice has been enhanced throughout the library, albeit in a somewhat indirect manner, by means of regular information sharing related to the web development process. As that process is based on evidence-based practice, staff members in the library have been learning about evidence-based principles indirectly.

Unfortunately, the program has not provided a solution for a number of issues. For example, not all usability problems with library provided services and resources have been addressed. Some of these are very difficult to solve because they are related to incompatibilities or inconsistencies between vendors and therefore the products cannot be readily adapted in ways that would provide for a more integrated or functional use within the overall web environment.

For problems that we can control, the biggest impediment has been resource and time constraints within the library. A particular issue has been the challenge of moving the tasks associated with website design and maintenance from being a "B-list" job to being an imperative for library staff (Kent et al., 2003). Another issue is that given the early stage and evolving

nature of the program, there are not currently enough staff in the library who are involved in the process to make major inroads into many of the secondary parts of the website, although progress is being made in this area.

Perhaps most importantly though, and a good indication for the future, is that the level of discourse related to the website has been elevated. Although it is difficult to measure something this intangible, the consensus of opinion among group members is that they can observe a different tenor to discussions related to website design throughout the library. While this does not mean that we have reached a “web design utopia,” members of the group cite as evidence of a change conversations where people are more likely to say “Well, what does the data say?” rather than “Well, in my opinion...” as they did in the past.

This positive aspect does not, however, minimize the inherent difficulties involved in overcoming a legacy of library research primarily based on case studies, surveys, and a limited repertoire of qualitative approaches (Eldredge, 2002). While great strides have been made at the library in moving forward, practical implementation has been hard in an environment where not everyone is convinced of the validity of evidence-based practice. Using evidence-based models that take into account the unique issues related to librarianship (Crumley & Koufogiannakis, 2002) has made implementation in the library easier, but we can still observe some of the same indicators that Walshe and Rundall (2001) have noted as impeding progress: there are still those who feel that evidence-based practice subverts the expertise of individual librarians and fails to address questions in a manner that is relevant.

It is quite possible however, that many of these objections are surface-level indicators of the more fundamental conflicts that face academic libraries today, much of that driven by the tension created by investment and increasing dependence on information technology to deliver library and information services as well as the convergence of the roles of libraries and information technology providers (King, 2000).

Conclusions

While it would be premature to declare the use of evidence-based practice within the Web Advisory Group a success, positive changes can be attributed to the use of evidence-based practice.

Website usability has been improved and this can be demonstrated through empirical (and anecdotal) evidence. Furthermore, while the evidence is based on anecdotal information, there is consensus that the nature and manner of discourse related to the website has been elevated to a higher level as people now rely more on examinations of data rather than opinion. Much of this change is attributed to the role members of the group play as “ambassadors” or “evangelists” for user-centered design and evidence-based practice. Furthermore, knowledge of evidence-based practice has been enhanced throughout the organization by regular information sharing about the web development process.

On the other hand, evidence-based practice in the Web Advisory Group has not been a panacea either. Many problems have not been solved either because of issues related to vendor-supplied products that cannot be modified or lack of resources within the library to perform all of the activities required to bring all areas of the website up to standards.

And while significant movement has been made in establishing an environment based on evidence-based practice, global acceptance still remains elusive. However, by continuing to work on developing evidence-based models that take into account the unique issues related to librarianship, the author believes that evidence-based practice will become the norm. This is particularly likely if we continue to develop and reinforce these evidence-based skills in both current and new staff in the library.

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Evidence-Based Practice to Enhance Library Web Site Usability: An Implementation Case Study at Northwestern University Library

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