

Usability Analysis of a Caribbean Academic Library Website: A Case Study

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ABSTRACT

This study proposed a usability evaluation of the web site of the Main Library of the St. Augustine Campus of the University of the West Indies (UWI). It sought to get users and site visitors to identify the major strengths and weaknesses of the site and to incorporate the results and participant feedback into a redesign to reflect users' intuitions rather than those of the site developers and librarians. The site was revised and redesigned in June 2005 following the recently appointed Systems Manager's dissatisfaction with the content and design of the previous site. The revision was led by the web administrator with input from the librarians. It was, therefore, an in-house, systems (library) centred initiative. Even though a test and production site was constructed, no formal usability study of the revised site had been conducted to take into account real users and their interaction with the site.

To further these aims the study used a combination of experimental and respondent research strategies. In addition, both usability heuristics [16] and ISO guidelines [10] were used to assess effectiveness, learnability, usefulness and user satisfaction. While there were several methods available to evaluate usability, this study used a multilateral approach to include self completion questionnaires, focus groups, formal usability testing and card sort.

Respondent strategies used a sample size of 529 participants for the self completion questionnaires and 16 participants in the focus group sessions. Experimental strategies combined observation of 21 individual participants and 3 groups of participants in the usability tests. In the card sort protocol 9 individual participants and 3 groups of participants were observed.

Findings revealed challenges in the site's information architecture with specific reference to the labelling and organization and how users made sense of these. Also identified were challenges in the interface design.

Limitations include a need for more ethnographic and indirect observational approaches to elicit distinctive Caribbean user behaviours on the one hand, and to minimize participant anxieties associated with direct observational approaches on the other. However, it should be noted that the latter point was addressed as far as possible in the study, within the boundaries of its scope.

The study recommended that similar usability evaluations be undertaken at the other UWI campus library websites and on other types of interface such as the library's online public access

catalogue (OPAC); it also recommended that usability training should be incorporated into the culture of the library organization. Critical next steps for the web designer were also suggested.

The value proposition for this project was seen in the lessons of organizational change and the impact of technology on relationship between systems and user services librarians.

Keywords:

Communications audit; human computer interaction (HCI); information architecture (IA); user centred design (UCD); web usability evaluation; web semiology

1. INTRODUCTION

Web usability evaluations and reports of their results identify key design challenges for designers to attend to and suggest to senior management the implications of these challenges for institutional branding. They also equip web developers and senior managers with the information, knowledge and intelligence about users' impressions, experiences and performances so that they can improve the quality of the web product/service of any organization.

A library's web site can be seen as a virtual equivalent of the physical library [8] [24]. Usability evaluations of library web sites study all aspects related to how users find information on these sites [22]. Studying library web site usability teaches librarians and web developers how to design information experiences in ways that match the information seeking intuitions and behaviours of their clients today or risk losing their clients to more competitive online service providers tomorrow.

This project is about evaluation of an information system, more specifically, a Campus Wide Information System. The case is an evaluation of the Web site of a university library which studies the case of the Main Library's web site at the St. Augustine Campus of the University of the West Indies (UWI).

According to the figures provided by the UWI Faculty report 2005/2006 [34], the Main Library Web site serves over 12,000 student visitors from four (4) faculties within the St. Augustine Campus of the university: Faculty of Engineering (FE); Faculty of Humanities and Education (FHE); Faculty of Science and Agriculture (FSA); and the Faculty of Social Sciences (FSS). The number also includes student visitors from the UWI Distance Education Centre (UWIDEC). The previous web site had served the student community for approximately seven years but the Systems Manager recommended a revision of the site due in part to its age and to its perceived irrelevance to the times. The revision of September 2005 was led by the Systems Unit in consultation with other divisional librarians at the Main Library, a systems library-centred approach. Since its revision no formal usability evaluation of the current web site at the Main Library has been commissioned. This limits understanding as to how users and site visitors interpret and make sense of the site.

While there have been usability studies of the websites of hybrid (college and university) libraries and digital libraries [12] few, if any, have been replicated within the English speaking Caribbean. The only Caribbean study of internet use is that by

Miller and Slater [5] in their ethnographic study of Trinidadians use of the internet. More recently Ramlogan and Tedd [30] studied the use and non use of electronic information resources (EIS).

The study proposes an in depth usability analysis of the St. Augustine Campus library web site in Trinidad over a period of two (2) months. It focused on library users and site visitors in an attempt to:

- Identify the major strengths and weaknesses of the current site
- incorporate the results and user feedback into a user-friendly redesign for library users and site visitors as well as lay the groundwork for future site revisions

To realize these aims the study used a combination of usability heuristics [16] and ISO guidelines [10] to:

- establish whether the site does what users need it to do (usefulness);
- assess the use of the web site product notably the ease of use to achieve the desired task (effectiveness);
- assess how easy it is to learn the site, the progression from novice to skilled user (learnability); and
- determine the users attitude towards the site, how enjoyable it is to use it (user satisfaction)
- Use a multilateral approach to the study of site usability including survey questionnaires, focus group sessions, formal usability tests (including think aloud protocols) and card sorting
- Combine both quantitative and qualitative analyses of the data

The study set out to answer the following questions:

- What are the goals of the revised site?
- Why was there an absence of stated goals for the site?
- Why does the revised site exclude user feedback?
- How do users feel about the revised site?
- Have real users tested the site? Are they satisfied with the revision?
- What suggestions do users have for improvement and redesign of the current revision?

2. LITERATURE SURVEY

The literature on academic library web site usability combines guidelines on usability evaluations with current and retrospective studies that have themselves employed usability analysis to inform web site (re)design. The consensus is that usability studies, in general, and those of academic library web sites in particular, inform web designers and (library) managers about the design interface and information architecture of web information systems. Additionally, regardless of the usability evaluation method, designers and managers can learn how effective and efficient the information system is. They can also learn about the satisfaction levels of users of the system. This all feeds back into the (re) design of the site. But at a more fundamental level, usability studies provide insights into how useful a (n) (academic) (library) website is; study the impact of the actual presentation of the online information service; increase the value of the Web site, while affirming the integrity of the library organizations that commission them [6].

Usability has been defined as a result, the attribute of quality that makes a product usable, such as a usable

software/system/website. It can be a process such as user centred design [2] [21] to create usable products/services. It can also refer to a set of techniques such as formal usability testing, heuristic evaluation or paper prototyping used to achieve the quality of being usable. Or, it can refer to a design philosophy to meet the needs of users [4] [35]. Nielsen and Loranger [15] further argue that usability specifically refers to 'how quickly people can learn to use something, how efficient they are while using it, how memorable it is, how error-prone it is, and how much people like using it'.

Attempts to define usability also include distinguishing it from information architecture (IA) [14]. While usability has been described as a subset of IA and as encompassing some IA principles it is not to be confused with IA. The difference between IA and usability is a matter of focus. User experience of the interface is the main focus of usability while the main focus of IA is the structuring of information for the search interface (organization, navigation, labeling and search systems)

Some additional perspectives on usability include:

- learnability [16]
- findability [27]
- accessibility [1] [32]

Others categorize usability as inherent or apparent; user/user design(er) centred [25] [13].

Because of the shared concerns with audience and how they experience user interfaces, usability studies enjoy a close association with and may be considered a form of micro-ethnography. Also, many terms used in human computer interaction (HCI)/usability are related if not synonymous to ethnography [11].

Usability testing has also been used as a cover term to describe all methods in usability evaluation as well as to refer specifically to one method. This review and study consistently distinguish between description of all methods as usability evaluation and one of the methods, usability testing.

3. METHODOLOGY

A multi-method approach combining respondent and experimental research strategies was chosen following review of the literature of established guidelines on usability evaluations [6] and current and retrospective studies such as VanderCreek [23]. Following careful review of several user centred design methods (UCD) and consistent with the aims of the project, four approaches were selected: survey questionnaires (SQ), focus groups (FG), user tests (UT) and card sort (CS). These were selected to maximize their combined strengths.

3.1. Overall Sampling

Respondent strategies used a sample size of 529 participants for the survey questionnaires and 16 participants in the focus group sessions. Experimental strategies combined observation of 21 individual participants and 3 groups of participants in the usability tests. In the card sort protocol 9 individual participants and 3 groups of participants were observed.

3.2. Piloting

The SQ was piloted with ten student volunteers before distribution at the academic communication courses. Also

piloted was the UT, the result of which yielded changes in the wording to clarify tasks and two additions to the test items to give breath and depth to the range of activities.

4. DATA COLLECTION

4.1. Survey Questionnaire (pre-test)

To ensure maximum distribution among distinct user groups both print and online questionnaires were used as part of a pre-assessment instrument. The questionnaire aimed to collect some demographic as well as some use/usage data. It combined both open-ended and pre-defined answers to facilitate both qualitative and quantitative data analyses respectively.

In accordance with the university's research procedures and ethics policy, the online questionnaire was hosted on the Main Library's website and the researcher, a university employee, was responsible for promoting the questionnaire by flyer indicating the questionnaire's Uniform Resource Locator (URL).

Respondents for the print questionnaires were identified from the compulsory university courses including the academic communication courses which yielded participation from three faculties: FHE, FSA and FSS. Participants from the UWIDEC and the FE had to be targeted separately due to differences in the delivery and timing of those courses. Of the combined total of 529 completed questionnaires over 500 were print.

4.2. Focus Groups

To help guide the discussion in the focus group sessions the moderator used a set of questions that focused on the issues being studied. To avoid engaging participants in an abstract discussion about the site a multimedia projector was used to give participants a visual reminder of the site.

FG ethics included:

- Identifying a moderator unaffiliated with the research being conducted to avoid any bias the researcher might inadvertently contribute to the conversation. This allowed the researcher to act as recorder.
- Securing permission from participants to audiotape their responses before starting each session. All participants agreed

4.3. Usability test

4.3.1. Test items: The range of tasks and questions included searches for databases, journals, library publications and library support items which respondents to the questionnaire indicated they searched for. Initially, a pilot separate and apart from the main test was completed. It comprised seven test items and benefited from the assistance of a range of participant types: two student users, three user education librarians and one cataloguer.

4.3.2. Sample selection: To address the question of representativeness of the test population, users from the four faculties served by the website were included. Also included were users with special needs: the one and only visually challenged campus based user; the one and only confirmed learning challenged user; and one Colombian learner of English.

4.3.3. Sample size: To prevent repetitive observation of the same results the advice of Nielsen [19], which suggests testing no more than five subjects, was followed. However, to obtain as much qualitative feedback as possible and to ensure representative sample of the six distinct groups from the user population, three rounds of individual testing were scheduled and completed.

Group testing was used to increase the probability of discussion of search decisions to complete each task since few participants were willing to think aloud despite the timely questions of the moderators. There were three groups, two of which had five participants and one with three. Group members consisted of students from the Faculties of Engineering (FE), Science and Agriculture (FSA), Humanities and Education (FHE) and Social Sciences (FSS). Only one distance learning student represented the UWIDEC.

4.3.4. Role of researcher: Both the researcher and a colleague from another faculty did the testing but exchanged roles as moderator and observer/recorder. This was the only option available to the researcher in view of the unavailability of professional librarians and members of the web team. Even though Krug [33] agrees that anyone can do the testing (moderating and observing), Norlin and Winters [6] provide some basic guidelines which the researcher tried to follow.

4.3.5. User test ethics: To help reduce the anxiety of participants the task list had an introduction to state the goal of the test, to reassure participants if they are unable to find an item every time, to remind them about what is being tested and to inform them about the duration of the test (one hour for individual testers and thirty minutes for group testers).

4.4. Usability post-test questionnaire

To obtain participants reactions to the system they used, a post – test questionnaire was administered to the (21) twenty-one participants and each member of the group participants.

4.5. Preliminary card sort usage survey

A simple usage survey was conducted before individual and group sorts for participants to rank their use of links to content on the Home page and to learn how frequently or infrequently these were used. The survey was designed to highlight those most and less frequently used.

4.6. Closed Card sort

Card sort was selected to respond to two of the weaknesses of usability testing identified in the literature. On the one hand, it was intended to give the participants an opportunity to check that the information architecture and organizational structure of the interface, through its links and categories, made sense to them. On the other, it aimed to engage participants in the creation of new categories once they were dissatisfied with the existing ones.

The question of having groups representative of the user population was addressed by conducting two types of sorts: one individual sort which consisted of (9) nine actual participants; and three (3) group sorts two of which comprised (5) five participants and one comprising (3) participants.

Use of the group sort was also intended to capture the radical differences in opinion, energetic discussion and the eventual

reconciliation of these differences to identify a workable site structure seldom achieved during individual sorts.

Attempts to address some of the other challenges associated with card sorting included:

- Making sure that all card sorts, group and individual, followed the usability tests, and in cases where this was difficult (during the individual sorts which took place some two weeks after the test) participants were provided a copy of the usability tasks to help them be mindful of possible tasks as they sorted.
- Asking participants at the start of each session to keep in mind the tasks they had to complete during the usability test

All advice on the procedures for card sorting came from practitioners in information architecture (IA) [3], [27] and [20]. An email exchange with leading expert on the subject of card sorting, Donna Maurer, confirmed that our goal for the closed sort was valid and clarified several questions.

4.7. Card sort Exit survey

An exit survey was administered to all participants upon completion of the closed sort to obtain further information about participants and their needs.

5. FINDINGS

The CS and UT results confirmed the initial impressions identified in the SQ and FG. Immediate challenges included:

- A cluttered interface unhelpful to the novice user
- Ambiguous and misleading labels
- 36.8 percent of the headings on the home page were never used by more than half the participants in the card sort
- Inadequate accessibility for the learning challenged and hearing based users
- Absence of an intuitive site map and a search facility

6. ANALYSIS AND DISCUSSION

The most consistent finding was in two aspects of the site’s information architecture: labelling and organization. Results of the SQ hinted at these given that 107 (19.78 percent) of respondents selected unstructured content as the site’s worst feature. Results of the FGs also highlighted the IA issues most notably but not exclusively related to vocabulary.

But the preliminary impressions and opinions discovered in the respondent data would be meaningless if they found little or no confirmation in the formal usability test designed to get testers to perform tasks and locate content on the site and which would confirm or deny their initial impressions. Again the main issue preventing the testers from successfully completing tasks (4, 6, 7, 8 and 9) was the site’s architecture. Both the observational and time on task data confirm this. For instance, thirteen individual testers spent on average thirteen minutes either to search for or successfully complete task nine (see tables 1 & 2 below). Also evident from the tables below individual testers exceeded their six and a half minute time limit per task by a minimum of three minutes, while group testers exceeded their three minute limit by as many as eighteen minutes.

Table 1. Time on task (individual)

No. of individual Testers (%)	Task #	Average TPT*
6 (28.6)	4	11
7 (33.3)	6	9.7
7 (33.3)	7	13.6
12 (57.1)	8	11.3
13 (61.9)	9	13.7

Table 2. Time on task (group)

No. of Groups	Task #	Average TPT*
1	4	4
2	6	7
1	7	21
1	8	5
2	9	9

*TPT= Time per Task

It might be argued that having the same participants from the FGs involved in the user test must yield the same comments. But if at least (6) six participants in the user test never participated in the FGs and those who successfully completed the challenging tasks made similar comments and suggestions for improvement, then there is some consistency at least in the identification of the issues and sufficient basis for concern. Further, the post-test data also, confirmed the IA concerns identified.

Even the card sort exercise further captured and confirmed inconsistencies in how users made sense of the labelling and the organization of the site’s content. The new main headings derived from the predetermined labels excluded one of the old main headings. A list of seventeen new or potentially new labels included a new name for the old heading. There is a high similarity rating for only two new headings and their members.

Perhaps of even greater significance is the result of the usage data. While the aim of the usage data was simply to identify the most frequently and the most infrequently used labels the results of this activity suggest that the home page consists of labels that are never used. The existence of underutilized labels raises the question of whether they should retain their visibility on the home page; whether they should be used as subheadings; or whether they should altogether be removed. Results of the card sort activity only served to legitimize those questions particularly when the following list of underutilized labels is examined more closely:

- Caribbean Resources
- Contact Us
- Engineering and Physical Sciences
- Humanities and Education
- 24/7 Service

Two of these (Caribbean Resources and 24/7 Service) appear on the list of other labels which were unclear to individual or group participants. The other two (‘Humanities and Education’ and

'Engineering and Physical Sciences') were part of a misunderstood grouping headed by an equally misunderstood label called 'Divisions'. It was also noted that participants during the CS activity either renamed 'Divisions' as 'Faculties' as a heading or subheading, or placed its contents within another heading.

Some of the confusion might be explained by the use of labels and content which in no way match participants primary goal when they visit the site let alone how they find (search) for information in ways the CS exit survey details. Students are less likely to search for information by faculty divisions on a web site. This is how the library organizes itself and its collections in the physical space. In cyberspace, users are goal oriented and expect harmony between their target and methods of retrieving it.

The results of this study, therefore, prove that 'users need to be able to find content before they can use it - findability precedes usability' [27].

7. CONCLUSIONS

Based on the findings of the present study and some of the comments of its participants, a severity rating that prioritises those challenges that should be addressed with some degree of urgency appears below. Some of these are consistent with current best practices in web design.

Designers and web developers at the library should consider:

- Creating a text only version of the site to address the challenges of accessibility and findability for future hearing based users and users with learning challenges; a text only site also addresses the font size concerns.
- Reducing the clutter on the home page by hiding those labels that are never used to save the time of the user while increasing findability
- Reviewing content and bring them in line with labels and revising the labels where necessary. Clarification of labels to increase findability saves the time of the user
- Developing a site map to help reorient users (who search by browsing) when they lose their way
- Providing a site search facility for users who prefer to use more keyword type searches

In consultation with information professionals senior library managers should consider:

- Developing a list of site aims to inform the decision making along the journey of future iterations of the design process and to remove pressure from the decision maker; to answer the questions "Why have a website, what will it do and who is it for?"; and to be used as an evaluation metric
- Designing a site evaluation instrument and actively promoting it on the site itself both to get user feedback and to monitor the extent to which site aims are being met, thereby involving users in the design process

An important way forward which the web developers, senior managers and information professionals should consider is usability training for staff. In addition to the benefits of

knowledge and skills based training for staff involved, usability training is a vehicle for making 'the concept of usability pervasive throughout the culture of the (library) organization. This, in turn, enables usability to be a consideration in everything that is developed within the library and not just web-based services' [9].

An area for further investigation is the OPAC interface. Even though the study focused on the web interface some findings raised several issues related to the OPAC interface. These were omitted from the final report because they were outside the scope of the study and because they would raise questions about the information literacy of users, a prerequisite for using the OPAC. Another important question that it raises and which the research literature identifies [23] [29] is whether the challenges users experience while using the OPAC is a function of poor design or of low information literacy skills, also for further investigation.

While the use of closed sorting in this study was limited to validating how users made sense of current categories and labels, a major limitation was the use of mainly high level and medium level labels. Future UCD projects involving CS may benefit from a more balanced approach to representing content by the inclusion of some labels that are lower in the hierarchy. They may also benefit from using some of the proposed labels to initiate an open sort.

Usability evaluation projects of this nature which rely singularly on externally established standards for best practice suffer a lack of culturally determined criteria for best practice in usability [26] [31] [7]. They can only confirm results similar to those other researchers have found and agree with the literature on established guidelines. They can hardly identify what distinguishes the behaviour of this Caribbean user group from others within the region and beyond. Usability solutions for one culture may be inappropriate for another [17]. This strengthens the case for evaluations which use more ethnographic approaches such as contextual enquiry [27], and anthropological and psychological approaches such as diary studies [28]. Future projects for the Cave Hill and Mona Campuses may benefit from these and other cultural approaches to web usability analysis.

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