

# Creating a user-centred library Website through usability testing: a case study at Open University of Sri Lanka

Anusha Wijayaratne  
Senior Assistant Librarian  
Open University of Sri Lanka  
Tel:+94112881593  
E-mail: idwij@ou.ac.lk

Ramani Amarasekara  
Senior Assistant Librarian  
Open University of Sri Lanka  
Tel:+94112881419  
E-mail: ramar@ou.ac.lk

## ABSTRACT

**Purpose:** The purpose of this paper is to share the lessons learnt from conducting usability testing at the Website redesign project of the library of Open University of Sri Lanka (OUSL).

**Design/methodology/approach:** Redesign project was carried out in a multi stepped process using several techniques and tools. A mixture of quantitative and qualitative data collecting methods was used to determine the user needs and expectations; recognize user-preferred terms and identify strengths; weaknesses of the existing Website and measure the standard of the redesigned Website.

**Findings:** The results of the think aloud protocol (TAP) test on the existing library site indicated some problematic areas with respect to both Web design and Web content while the TAP test on redesigned site proved strength of the new site in terms of organization of information and navigation. The card sort protocol test produced a set of user preferred-terms and suggestions on organization of elements in the site's homepage. The user survey and the focus group discussions revealed several issues that hinder the use of the library site and generated valuable insights to raise the standard of the new Website.

**Originality/value/conclusion:** There are numerous evidences in the literature on library Website redesign projects that have been carried out in USA and European countries. However, there is hardly any evidence for such projects from Asian and African regions. Therefore, the content of this paper will contribute towards enriching the literature by extending boundaries and may provide some useful guidance for Asian librarians who are interested in creating a user-centered Websites.

## Keywords

Library Website redesign, Usability testing techniques, Web accessibility evaluation, Web content accessibility guidelines

## 1. INTRODUCTION

In this up coming information society, librarians found it impossible to meet the user demands, with the physical library alone. Librarians chose Web channel for delivering library services to meet the demand for time and place independent service in order to accommodate busy life styles of their clientele. This innovative move to the cyberspace has created a dominant position for the library Website since it stands for the meeting ground between the librarians and their users in the virtual world.

The academic library Website has come a long way. Schnell [2005] mentions that the Web arrived at the desktop of librarians with the release of the Web browser Mosaic in 1993. Since that time libraries in all sectors are becoming increasingly used to the idea of having a Website [Rowlands *et al* 2000]. McGillis & Toms [2001] point out that in today's standard a Website should be a cohesive, navigable, content-rich domain. It is no longer just the presentation of content but, in fact, is a gateway to many types of content. Therefore, ongoing monitoring and updating of the Website is very crucial for the modern libraries.

Librarians should update and redesign their Websites regularly with the purpose of maintaining the design accuracy and content richness of the site. Going on and on with an ineffective Website is a very big barrier in achieving development goals and also it can seriously affect the image of the library as well as the reputation of the parent institution.

Significant amount of resources in terms of funds, time and skilled staff are needed to redesign a Website. Above all librarians should learn proper techniques to perform usability testing process.

## 2. LITERATURE REVIEW

Fortunately, literature is rich in this aspect. There is a wide spectrum of publications that discuss the different facets of Website designing and maintaining.

### 2.1 Library Website Redesign Projects

Studies within the body of the literature on Website redesign projects are very good sources to get to know these different techniques of Website design and learn the art of conducting usability testing.

There is a series of scholarly articles that describe various usability evaluation tools and testing processes together with experience and lessons learnt by library professionals in conducting Website redesign projects in different environments [Cahill 2009; Rogers & Preston 2009; Kane & Hegarty 2007; MacMillan *et al.* 2007; Riley-Huff 2007; Humbert & Tilley 2006; Stephan *et al.* 2006; Ward, 2006; Tolliver *et al.* 2005; George 2005; VandeCreek 2005; King & Jannik 2005]. Two important factors that all these studies highlight are that Website redesign is not that arduous or expensive as it may appear to be and design user-centred library Website is possible inspite of limited resources.

## 2.2 Web Accessibility Guidelines

Another important source of information that is essential for successful Website design is Web accessibility guidelines. Accessibility to every one regardless of abilities and disabilities is very critical for a Website that is catering for a wide range of users. Accessibility standards help Web designers to identify and address accessibility issues [Foley 2003]. Web Content Accessibility Guidelines (WCAG) developed by the Web Accessibility Initiative (WAI) of the Worldwide Web Consortium (W3C) is the most widely accepted publication, which gives Web-developer a concrete set of rules to construct a barrier-free Website. WCAG 2.0, which was released in December 2008 is available at <http://www.w3.org/TR/2008/PR-WCAG20-20081103/>. Besides, there are numerous sets of guidelines that have been formulated to address the specific needs of a nation, institution or field of interest. Elsevier User Centred Design Group Guidelines for Libraries (<http://libraryconnect.elsevier.com/lcp/0502/lcp0502.pdf>) and International Federation of Library Associations (IFLA) Checklist for Access to Libraries for Persons with Disabilities (<http://archive.ifla.org/VII/s9/nd1/iflapr-89e.pdf>) are very good tools for library Web developers. In addition, guidelines that focus on Websites of academic institutions such as Yale Style Guide (<http://webstyleguide.com/>) and Illinois Implementation Guidelines for Web-Based Information and Applications 1.0 (<http://www.dhs.state.il.us/IITAA/IITAAWebImplementationGuidelines.html>) include features that also could be applied for a library Website.

## 1.3 Automatic Web tools

There are inexpensive approaches and several simple steps that can produce immediate results [Peters 2006]. Web developers can use free or open-source Web tools to recognize the accessibility barriers and to measure the level of accessibility of Websites. WAVE (<http://wave.webaim.org>), A-checker (<http://achecker.ca/checker/index.php>), Accessibility Check (<http://www.etre.com/tools/accessibilitycheck/>), W3C Markup Validation Service (<http://validator.w3.org>) are several good examples for such tools that are easy to use.

## 3. WEBSITE REDESIGN PROJECT

Open University of Sri Lanka (OUSL) is the leading distance education institution of the country. The OUSL library plays the key role in providing information to facilitate teaching, learning and research of the OUSL community scattered throughout the island. Web-based library services are very vital to provide time and place independent service for distance learners. Therefore, OUSL library maintains a Website since 1998.

OUSL library decided to launch a Website redesign project in 2008 to fulfill the following goals;

- introduce new services
- eliminate serious accessibility problems of the existing Website
- eliminate library jargon and find terms that users recognize
- establish clear site organization and navigation
- create a new look and feel that is both usable and inviting

## 3.1 Research Instruments

Six types of instruments have been used to collect data in different steps of the project. They are;

- think aloud protocol (TAP) tool, which includes a set of 12 tasks, an observer's worksheet and an introductory script
- focus group discussion (FGD) schedules
- user survey questionnaire
- card sort protocol (CSP) tool which includes a set of keyword cards, a worksheet and an introductory script
- paper prototype design
- automatic Web tools – WAVE (version 4.0), W3C Markup Validation Service, Juicy Studio Readability Test

## 3.2 Redesign Process

The Website redesign process was consisted of 5 steps

Step 1: measure the status of the existing Website

Step 2: explore the needs of user community

Step 3: identify the user-preferred terminology

Step 4: measure the status of the proposed Website

Step 5: execute the technical construction of the Website

Step 6: Measure the standard of the redesigned site

### 3.2.1 Measure the Status of the Existing Website

A redesigned project cannot be launched successfully without knowing the strengths and weaknesses of the existing system. The instruments used during this step are, think aloud protocol tool kit and automatic Web tools.

#### 3.2.1.1 Think Aloud Protocol (TAP) – Existing Site

Six participants were selected to represent the cross section of the user population of OUSL library. All participants were encouraged to speak aloud throughout the test, verbalizing their thought processes and rationale behind decisions. Participants were asked to perform twelve tasks. Each task was written on 5"x3" cards and given to the participants one by one in random order. One member of the project team interacted with the participant while another member recorded the participant's actions using the worksheet. Allocated time per task was 5 minutes. If the participant was unable to complete the task within the given time, he/she was asked to move to the next task.

The level of success in completion of the tasks were measured using the scale:

- Very successful (VS) - found the information quickly in the shortest possible path
- Successful (S) - found the information fairly quickly, after 1-2 false starts
- Moderately successful (MS) - found the information after several false starts
- Not successful (US) - did not find the desired information

#### 3.2.1.2 Automatic Web Tools

Level of Web accessibility of the existing library Website was measured using WAVE (version 4.0) and W3C Markup Validation Service in order to identify the problems in terms of key accessibility barriers for disabled and HTML errors.

### 3.2.2 Explore the Needs of OUSL User Community

It was very vital to examine the needs and expectations of the user community of the library. Two types of instruments – focus groups discussion schedules and a questionnaire - were used to collect the data from teaching staff, library staff and students.

#### 3.2.2.1 Focus Group Discussion (FGD)

Eight participants from the library staff and 11 participants from the teaching staff were selected to represent all categories and levels of teaching staff and library staff. FGD sessions for the teaching staff and the library staff were conducted separately using two slightly deferent FGD schedules. The sessions were tape-recorded with the consent of the participants.

#### 3.2.2.2 OUSL User Survey

A questionnaire consists of 3 sections, namely Section 1 – user profile, Section 2 – pattern of usage of the library Website, Section 3 – provisions for future development, was posted to a total number of 524 students of the four Faculties – Humanities & Social Sciences, Education, Natural Science and Engineering. Stratified random sampling technique was used to select the sample.

### 3.2.3 Identify User-preferred Terminology

Many researchers [VandeCreek 2005; Turnbow et al 2005; Adams & Cassner 2002] had pointed out that use of jargon is problematic for library users. Therefore, a special effort was taken to identify the terminology that can be understood by the OUSL user community.

#### 3.2.3.1 Card Sort Protocol (CSP)

A 40-itemed CSP tool was created by writing the terms on the 5”x3” cards. A description (what is meant by the particular term) was given on the reverse side of the card. Twelve participants were selected to represent the students, teaching staff and library staff.

A set of keyword cards and a worksheet to write down the preferred terms was given to the each participant together with a large table where they can spread the cards for easy pick-up.

### 3.2.4 Measure the status of the proposed Website

It is costly and time consuming to make revisions in a technically constructed site. Therefore, it was decided to test several possible designs before constructing site structure.

First step of the paper prototyping is to create a rough outline of the site based on data collected during preliminary studies and observing the revised list of design features. The team members went through several international library sites that were selected as good examples for usable and accessible sites. Then the site structure was created using paper and pen. Different coloured papers were used to design different layers of the site to facilitate the performance of playing the computer when conducting think aloud protocol test using paper prototype of the Website. Coloured pens, sticking papers, screen prints etc have been used for highlighting or representing forms and navigation paths in the prototype.

### 3.2.4.1 Think Aloud Protocol – Proposed Website

The list of tasks and the introductory script used for the first TAP sessions were modified to meet the requirements of the prototype design. The six participants of the first ‘think aloud protocol’ test participated.

A member of the team played the role of the computer while participant’s index finger played the role of the computer-mouse. For example the participant was asked to point out the keyword/s in the prototype page that he/she thinks as the appropriate link to find the required information and the team member who played the role of the computer produced the relevant page.

### 3.2.5 Execute the Technical Construction of the Site

Joomla version 1.5.6 was selected to develop the site. It was selected over the other popular Content Management System (CMS) packages because all the Websites of OUSL are on Joomla.

### 3.2.6 Measure the Standard of the Redesigned Site

The technically constructed Website was tested using TAP and automatic Web tools. The process of conducting the tests was almost similar to the process used at the first step. The six participants from the first TAP sessions and two new participants were participated.

## 4. IMPORTANT FINDINGS

The findings of the usability studies and use surveys brought a lot of insights to the project. This section discusses the key findings that influenced the process.

### 4.1 Status of the Existing OUSL Library Site

Findings revealed some problematic areas as well as several strong points of the existing OUSL library site. Table 1 presents the results of the TAP test in terms of success of participants in performing the tested tasks.

**Table 1 Status of success of participants – existing library site**

no. of times VS	no. of times S	no. of times MS	no. of times NS
27	21	17	7

VS – very successful; S – successful; MS – moderately successful; NS – not successful

All the participants except one, managed to complete more than 6 tasks either very successfully (VS) or successfully (S). However, none of the participants managed to complete all the 12 tasks.

Another factor that came out from the TAP test is the poor usage of library Website. One participant said that he did not know the availability of the online catalogue. Another participant said that she hadn’t heard about the e-journals before coming to the sessions. Above all, all of them declared that they learnt a lot of new things about the library Website by attending the TAP sessions and they wish to visit the library Website more often hereafter.

Table 2 presents the problematic areas identified during the TAP and FGD sessions.

**Table 2 Problematic areas of the Website**

<b>Content</b>	Some of the past question papers are difficult to read, some information and services are missing. Examples: Abstracts of OUSL dissertations, On-line chat room, information about the regional libraries
<b>Terminology</b>	Terms 'New arrivals', 'Support staff', 'e-journal databases' were not clear to many participants
<b>Appearance of the site</b>	Top menu bar is not very attractive, font colours of the e-journal list is not very visible; blinking of two images in the homepage is disturbing, the top menu is not visible
<b>Organization of the site</b>	Catalogue is not given a prominent place, Organizing of information within the site is not in a logical order, e-journal list is very complicated, items of the left menu bar are not properly organised, A lot of scrolling down is needed to find some of the important information
<b>Structure of the site</b>	Homepage and left side menu are very long and need a lot of scrolling down, there is a lengthy blank space between last two paragraphs in the homepage
<b>Currentness of the site</b>	Some information under the 'Library news' is quite old, two links are inactive,

Participants also voiced several strong points of the existing OUSL site namely, site is informative, multiple reference options are provided, multiple accesses to important services are provided, new arrival list is very useful and background colour is nice. The results of automatic evaluation tests highlight several accessible barriers that should be eliminated immediately to enhance the accessibility for differently-abled persons and people using different browser options etc. Table 3 presents the findings.

**Table 3 Results of evaluation tests - existing OUSL library site**

Measurements	Scores	Status
Accessibility errors per page (WAVE results)	3.8	Poor
HTML errors (W3C Markup Validation Service results)	23	Poor

## 4.2 User Needs and Expectations

After analysing the gathered information through TAP, FGD and user survey, the following recommendations have been made for considering during the redesigning of the site and afterwards;

- homepage should be shortened and reduce scrolling down
- links should be checked and updated at least once a week
- text should be updated at regular intervals
- specific information for staff should be given in a separate section (there are some information and services that are meant only for the OUSL teaching staff and these links are misleading to students)
- terms that are meaningful to the students should be used
- content of the Website should be improved by strengthening all 4 dimensions – resources, services, links

and information site should be made more attractive by adding some colours and navigational aids

- training sessions have to be conducted to improve the information literacy skills and computer literacy skills of the students
- promotion campaign should be launched to promote the library Website among the users

## 4.3 User-preferred Terms

Out of the 40 terms that researcher suggested, participants agreed with 31 terms. Table 4 presents the suggestions made by the users for the 9 terms.

Table 4 Alternative terms suggested by the participants

Terms suggested by the researcher	Suggestions for alternative terms made by participants
Ask a librarian	Ask a question, Need help
Become a member	How to become a member
Current content pages	Current content pages of printed journals
Document delivery	Request articles
FAQs	Frequently asked questions
Find books	Library catalogue
Library forum	Meet library friends, Share with library friends
Library glossary	Library terms
Library tour	Take a virtual tour to the library

## 4.4 The Status of the Proposed Website

Several members of the library staff and teaching staff were consulted during the prototype design process and made modifications in areas such as use of terms, organization and presentation of the information in the homepage, navigational techniques etc.

The results of the TAP test on paper prototype design was very encouraging since the majority of participants were either very successful (VS) or successful (S) in performing all 12 tasks. Results are presented in the table 5.

Table 5 Status of success of participants – paper prototype

no. of times VS	no. of times S	no. of times MS	no. of times NS
57	13	2	0

VS – very successful; S – successful; MS – moderately successful; NS – not successful

## 4.5 Status of the Redesigned Website

After constructing the basic structure of the Website together with the first level and second level pages and key pages in the third level a set TAP sessions were carried out to measure the appropriateness of the structure and the navigational system of the site.

The results of the think aloud protocol sessions were very impressive. Table 6 presents the findings.

**Table 6 Status of success of participants - redesigned site**

no. of times VS	no. of times S	no. of times MS	no. of times NS
78	16	2	0

VS – Very successful; S – successful; MS – moderately successful; NS – not successful

It is great to see that the performances of the participants have been improved significantly. Six participants who participated in all three TAP sessions reported a steady progress. Getting familiar to the test and the tasks may have some influence on these good results. However, the structure, navigational mechanism and the organization of the information in the new site have certainly boosted the exceptional results achieved. One of the evidence is that the performances of the two new participants were nearly as good as the experienced participants. Besides, it was quite noticeable that participants, who rarely used the navigational aids during the TAP session on existing Website, used the navigational aids frequently during the testing of the redesigned site. Therefore, their lack of skills was not very visible in this session. This is a good indication that a good design can overcome some of the problems related to user-skills as well.

At the first attempt, results of the automatic Web tools indicated an accessibility barrier and 2 HTML errors. Necessary steps were taken immediately to fix those problems.

## 6. DISCUSSION

Conducting usability testing was a very good learning experience for the Web team. Observing real users performing tasks, gave an opportunity to develop a close contact with users and to understand the shortcomings of the users, in addition to revealing the weaknesses of the Website.

The findings of the usability testing pointed out several critical factors that cause poor usage of e-resources. A factor that became very much obvious is that the lack of awareness of the existence of a library Website. Some participants of the think aloud protocol test and the OUSL user survey, declared that they were unaware of the existence of the library Website or the value of its resource collection. Several researchers [Taha 2006; Atilgan & Bayram 2006; Penka 2003; Blackman 2003] also have observed this phenomenon during their studies. Hence, it is obvious that unawareness of the Web-based library systems is a common issue for many countries.

Besides, it was observed that the lack of e-literacy skills of users was causing problems in performing the information seeking tasks. This also seems to be a common problem all over the world. McMullen [2001] mentions that students do not often possess the necessary information literacy or critical thinking skills for locating the proper resources for their research needs and Taha [2006] points out that lack of e-literacy skills of users is an obstacle that reduces utilizing e-resources.

## 5. CONCLUDING REMARKS

OUSL project is a success story for a low cost Website redesign project. The staff of the OUSL library did not have much previous experience on the subject. Hence, the Web team spent hours on studying the usability techniques and software solutions before the implementing of the project. The contribution made from the

part of the teaching staff and the student community was very helpful. The results of the final TAP test proved the strength of the new site in terms of organization and navigation while many participants praised for the expansion and upgrade of the content factor. In addition, number of them mentioned that new site is looks simple but professional.

Librarians in the USA and Europe have already in command of mastering their Website quite effectively to bring the service to the doorsteps of their users. However, librarians of Asian and African regions seem to be not in very much focus on the standard of their Websites. Lack of funds, skilled staff and unawareness might be the major reasons for this slow progress. From the authors experience, it can be assured that carrying out a reasonably successful Website redesign project needs staff time and commitment more than the funds and experts. Use of open-source or free software products and utilize of available human resource effectively would help to keep the expenses within the affordable range. More importantly, it is very much needed to raise the awareness among the librarians in the region on the value of barrier-free, user-centred Websites in enhancing the utilization of resources and services that are delivered through Web channel.

## 6. REFERENCES

- [1] Adams, K., Cassner, M. 2002. Content and design of academic library Web sites for distance learners: an analysis of ARL libraries. *Journal of Library Administration*, 37 (1/2) 3–13.
- [2] Atilgan, D., Bayram, O. 2006. An evaluation of the use of the digital libraries at Ankara University, Turkey. DOI=<http://eprints.rclis.org/archive/00005623/>
- [3] Blackman, R.F. 2003. A study of the perceptions and attitudes regarding library services available to students enrolled in online degree programs. PhD Thesis, University of Tennessee.
- [4] Cahill, K. 2009. Building a virtual branch at Vancouver Public Library using Web 2.0 tools. *Program: electronic library and information systems*, 43 (2), 140–155.
- [5] George, C.A. 2005. Usability testing and design of a library Website: an iterative approach. *OCLC Systems & Services*, 21 (3), 167-180.
- [6] Humbert, S.I., Tilley, E.A. 2006. Redesigning a web site in-house to improve information literacy: experiences of a small library. *Program: electronic library and information systems*, 40 (4), 346-360.
- [7] Kane, D., Hegarty, N. 2007. New web site, new opportunities: enforcing standards compliance within a content management system. *Library Hi Tech*, 25 (2), 276-287.
- [8] King, H.J., Jannik, C.M. 2005. Redesigning for usability: information architecture and usability testing for Georgia Tech Library's Website. *OCLC Systems & Services*, 21 (3), 235-243.
- [9] MacMillan, D., McKee, S., Sadler, S. 2007. Getting everyone on the same page: a staff focus group study for library web site redesign. *Reference Services Review*, 35 (3), 425-433.

- [10] McGillis, L., Toms, E.G. 2001. Usability of the academic library Web site: implications for design. *College & Research Libraries*, 62 (4), 355-367.
- [11] McMullen, S. 2001. Usability testing in a library Web site redesign project. *Reference Services Review*, 29 (1), 7-22.
- [12] Penka, J.T. 2003. The technological challenges of digital reference. *D-Lib Magazine*, 9 (2). DOI=<http://www.dlib.org/dlib/february03/penka/02penka.html>
- [13] Peters, T. 2006. The weakest link: is it your Web site?. *Computers in Libraries*, 26 (6), 32-35.
- [14] Riley-Huff, D.A. 2007. Renovating the library Web Site: a case study. *Mississippi Libraries*, 71 (1), 16-19.
- [15] Rogers, R., Preston, H. 2009. Usability analysis for redesign of a Caribbean academic library web site: a case study. *OCLC Systems & Services: International digital library perspectives*, 25 (3), 200-211.
- [16] Rowlands, J., Forrester, W., Coelho, L., Cardy, L., Yeadon, J. 2000). Opportunities on the Web: a role for information professionals, using the development of the BMA Library online service as a case study. *Health information and libraries journal*, 18 (1), 45-53.
- [17] Schnell, E.H. 2005. Writing for the Web: a primer for librarians. DOI= <http://bones.med.ohio-state.edu/eric/papers/primer/toc.html>
- [18] Stephan, E., Cheng, D.T., Young, M.L. 2006. A usability survey at the University of Mississippi libraries for the improvement of the library home page. *Journal of Academic Librarianship*, 32 (1), 35-51.
- [19] Taha, A. 2006. Web-based library services to support e-research at UAE University. In Proceedings of the Seventh Annual U.A.E. University Research Conference (UAE University, April 22-24, 2006). DOI= [http://sra.uaeu.ac.ae/Conference\\_7/Proceedings/pdf/Library/LIB\\_1.pdf](http://sra.uaeu.ac.ae/Conference_7/Proceedings/pdf/Library/LIB_1.pdf)
- [20] Tolliver, R.L., Carter, D.S., Chapman, S.E., Edwards, P.M., Haines, A.L., Krolikowski, L.E., Price, R.M. 2005. Website redesign and testing with a usability consultant: lessons learned. *OCLC Systems & Services*, 21 (3), 156-166.
- [21] Turnbow, D., Kasianovitz, K., Snyder, L., Gilbert, D., Yamamoto, D. 2005. Usability testing for Web redesign: a UCLA case study. *OCLC Systems & Services*, 21, (3), 226-234.
- [22] VandeCreek, L.M. 2005. Usability analysis of Northern Illinois University Libraries' Website: a case study. *OCLC Systems & Services*, 21 (3), 181-192.
- [23] Ward, J.F. 2006. Web site redesign: the University of Washington Libraries' experience. *OCLC Systems & Services: International digital library perspectives*, 22 (3), 207-216.

### Autobiographical note



ANUSHA WIJAYARATNE

Senior Assistant Librarian, Open University of Sri Lanka,  
PhD student University of Malaya, Malaysia

### Brief professional biography

I join the Open University of Sri Lanka in 2000. I have obtained my Masters Degree in Library & Information Science from the University of Colombo, Sri Lanka in 2003. Currently, I am reading for a PhD at the University of Malaya, Malaysia under the supervision of Prof. Diljit Singh.

I have presented several papers in national and international conferences and published 5 papers in peer-reviewed journals. My research interests are "accessible Web designing", "online real-time library services" and "e-information literacy skills".



RAMANI AMARASEKARA

Senior Assistant Librarian, Open University of Sri Lanka

### Brief professional biography

I joined the library of the Open University of Sri Lanka in 1987. I have obtained my Masters Degree in Library & Information Science from the University Loughborough University of Technology, UK in 1990. I have worked in the capacity of Reader Services Librarian for more than 15 years and presently, in charge of the Acquisition Department.