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Website Usability: A Window into a Learning Environment

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Abstract

Academic library websites provide a vital online learning environment for students. They should follow sound design principles, provide functionality, and ease of navigation. As part of a strategy to make effective changes to the library website, Edith Cowan University Library wanted to gather evidence to discover how users went about locating information resources accessible from its website. Concerns existed amongst the library staff about how intuitive it was to locate the various information resources provided. This paper will outline the action research process taken to test the website heuristics to determine what improvements were needed in the design. Using Jakob Nielsen's usability testing principles as a guide, we conducted usability tests with students selected from across the three metropolitan campuses. Results provided us with an understanding of how students approached the interface, which problems related to design and which highlighted an information literacy issue.

We will also explore what we learned about cognitive behaviour and student approaches to a research topic, from their construction of pathways to reach a result. We believe that usability studies, in addition to providing web designers with valuable information, have much to tell us about information seeking behaviour and how students approach their learning in the online environment.

Introduction

Academic library websites provide a vital online learning environment for students. In addition to information about library services, there is the ability to interact with library records to save searches and renew books. Increasingly, the website is the front end for students locating library collections with direct access to the content of online books and journals. As such, academic library websites need to follow sound design principles, provide functionality, and ease of navigation. Recently Edith Cowan University (ECU) Library decided to test its website design to discover how intuitive users found locating information resources accessible from its website. This paper describes the methodology and some of the findings.

Towards the end of 2005, ECU librarians held an information sharing forum. As there had been a proliferation of new online resource formats added to the collection, this forum was the first step in a review of the library's practices with presenting its electronic resources.

Usage statistics of the site were high and, prior to this forum, there was some debate as to whether we needed to invest time in a review. After the workshop however, it was evident that there was some concern about how the library presented its information resources.

One of the recommendations from this original forum was the formation of a working group to look more closely at that part of the library's website that dealt with the access to the library's information resources and make

recommendations for improvement. The Presentation of Electronic Resources working group was created with its terms of reference to evaluate and make recommendations on how the information resources on the library's website should be presented. The brief did not involve re-designing the library's website in its entirety, or the library catalogue interface. Where it was necessary to comment on these areas, suggestions were passed on.

An additional brief was to raise the profile of the new service providing federated searching across library databases, library catalogues, and other online resources: MetaQuest (AARLIN). The first round of recommended changes had to be made by the end of January to allow for completion before the start of the new semester in mid February 2006.

Research Methodology

Before making any recommendations for major change to the website, the group established a plan to meet the terms of its brief. This involved each member of the group conducting a web scan of other university library websites to identify preferred features and mock up a website reflecting these. The group discussed what features made the site user friendly and the benefits of the various access approaches used. This research provided us with a sound basis for later decisions made as a result of the usability testing.

A literature search assisted with methodology. This provided information on usability testing and a report on website terminology, which was useful in reminding of the importance of consistency and the need to avoid using jargon or acronyms when deciding on headings. (Kupersmith, 2006)

Even though statistics indicated that usage was high, individual students' search success was unknown. A way was needed to provide some evidence about how intuitive the students really found the approaches to information on the website. Usability tests were chosen as the best method for doing this.

As the intention was to involve the students as a central part of the process, the research methodology could be described as action research.

Action Research" is characterised by intervention in real world systems followed by close scrutiny of the effects. Its aim is to improve practice and it is typically conducted by a combined team of practitioners and researchers. The action research cycle: Data Collection > Evaluation > Action > Critical Reflection > Data Collection > Evaluation... (Wikipedia, 2006)

Usability testing

The literature research revealed Jakob Nielsen as the authority on usability testing and we used his guidelines to conduct testing. Nielsen has a sound message for those designing websites: "On the Web, usability is a necessary condition for survival. If a website is difficult to use, people **leave** (Nielsen, 2003, para.5)."

Nielsen defines usability as "a quality attribute that assesses how easy user interfaces are to use. The word "usability" also refers to methods for improving ease-of-use during the design process. Usability is defined by five quality components:

- **Learn ability:** How easy is it for users to accomplish basic tasks the first time they encounter the design?
- **Efficiency:** Once users have learned the design, how quickly can they perform tasks?
- **Memorability:** When users return to the design after a period of not using it, how easily can they re-establish proficiency?
- **Errors:** How many errors do users make, how severe are these errors, and how easily can they recover from the errors?
- **Satisfaction:** How pleasant is it to use the design? (Nielsen, 2003, para.3)"

Nielsen's basic approach summarizes the key steps the library took as a guide in its usability testing:

There are many methods for studying usability, but the most basic and useful is user testing, which has three components:

- Get hold of some representative users, such as customers for an e-commerce site or employees for an intranet (in the latter case, they should work outside your department).
- Ask the users to perform representative tasks with the design.
- Observe what the users do, where they succeed, and where they have difficulties with the user interface (Nielsen, 2003, para.8).

For a basic usability test, Nielsen suggests that five testers is sufficient as "after the fifth user, you are wasting your time by observing the same findings repeatedly but not learning much new (Nielsen, 2000, para. 6). ... After the first study with 5 users has found 85% of the usability problems, you will want to fix these problems in a redesign (Nielsen, 2000, para. 12). "

Usability testing process

Using Jacob Nielsen's work on usability testing as a guideline, the group began the process of conducting usability tests with a group of students selected from across the campuses.

The librarians devised four tasks targeting the following parts of the library website:

- Catalogue
- Online databases

- Virtual reference gateway
- Internet search tools

Test and observation sheets were developed for each task.

A sample of six testers: two students from each of the three metropolitan sites were invited to participate and incentives provided. Each tester was allocated a one hour time slot, which allowed fifteen minutes for each question. Two librarians observed one student at a time in the library seminar room so that the student's actions could be observed on the large screen. The librarians timed the process, transcribed the pathways used and noted areas of difficulty. The student was also requested to verbalize their actions.

Each task requested the student to start from the Library's website. Once the student had logged in and had the Library website on the screen, they were given a task sheet, asked to read the question and begin. It was made clear to students that there were multiple pathways to answering most questions and we wanted to observe the pathways they used to assist in improving the design of the site. The student could request to stop at any time in the process otherwise we would stop them after fifteen minutes on a question.

At the end of each session we were able to ask the student some questions and also provide some feedback to them on how to improve their searches.

The usability study was carried out twice, once in December of 2005 and again in February 2006 after initial changes to the website design.

Changes to the Website

The results from the first study in December 2005 indicated that aspects of the website design could be improved. This was done utilising findings from previous research.

The key change was to list menu options to access Information resources as an action rather than a format. Library Catalogue became find Books, CDs and more (Catalogue). The word catalogue was retained for those who related to this term.

Online Databases became find Journal Articles (Databases). The Virtual Reference Collection and Internet Search Tools became find Websites. Resources by Faculty became find Library Resources by Faculty, to further clarify this link.

Other changes included adding options to find Reserve Readings and to find Journal Titles. The journal titles option was included to show that there was a difference between searching for titles and articles and also to speed up the process for searching journal titles. A quick links section provided for searching of the catalogue and MetaQuest, the new service that we were trying to promote.

Following is a snapshot of the section of the library website that was tested, demonstrating some of the changes.

Library website snapshot 2005

information resources	library news
Library Catalogue	Catalogue End
Online Databases	Several new se
Resources by Faculty	available for acc
Virtual Reference Collection	postgraduates.
Internet Search Tools	setting up alert:
Learning assistance	preferred search
Liberty: Learning to Find Information	More>>
ECU Referencing Guide	Library Survey
	The Library sur
	during 2004. Th
	available. More

Library website snapshot 2006

find	quick links
<ul style="list-style-type: none"> ▶ Books, CDs and more (Catalogue) ▶ Journal Articles (Databases) ▶ Reserve Readings ▶ Journal Titles ▶ Websites ▶ Library Resources by Faculty 	<p>MetaQuest Login</p> <p>Quick Catalogue Search:</p> <input type="text"/> <input type="button" value="go"/>
	<p>Simo</p> <p>IT Services</p> <p>Student Information</p>
	news update
	<p>Reserve Collection Notice: Reserve items will not be available for loan until the end of exams.</p> <p>VDX Downtime Notice >></p> <p>EndNoteV9 Now Available >></p> <p>More news>></p>
learning solutions	
<p>Liberty: Learning to find information</p> <p>Getting Started at the Library</p> <p>ECU Referencing Guide</p>	

Results

Task one required the student to locate a specific book with the author, keywords from title, date of publication and unit code provided. This task was the easiest for the students, conducted in the shortest time with 100% accuracy and an average of 2.39 minutes across both studies.

Task two requested students to locate two journal articles on the psychological aspects of web site design. This task was the most difficult for the students: taking the longest time, an average of 11 minutes across both studies with 83.33% and 66.66% accuracy respectively.

Tasks three and four related to searching the Web. In the first study, the library website had two distinct entry points for web searching: selected sites and Internet search tools. For study two, these options had been integrated into a single page.

Task three requested students to find a link to the Morgan Gallop Poll website to locate information for a politics assignment. This took an average of 4.99 minutes across both studies with 66.66% accuracy

Task four: Students had to imagine that they were a lecturer wanting to locate more information about the opportunity for their chemistry students to meet with Nobel Prize winners in Lindau. This took an average of 7.6 minutes across both studies with 50% and 83.33% accuracy respectively.

Whilst usability testing told us about how we needed to improve the website design the key finding highlighted from the two studies was not one of design, but information literacy. To improve the results on each task would require additional assistance both at the point of access and as a general principle.

In addition, the act of observation provided us an opportunity to get to know more about our students' approaches to seeking information on a topic. Surprisingly, the approaches did not differ greatly between individuals, even though the pathways chosen differed. The students tended to be persistent in trying to locate the information with most of them having sound navigation skills. If one path did not render a result, another was quickly tried. Reading the results correctly on the screen was an issue in many cases as often the entry was displayed on the screen, but not selected by the student. Baulking at the unknown was common, particularly when presented with a list of databases that had not previously been encountered.

The online environment provides a wealth of data on user behaviour. Research from the related disciplines of online learning and human-computer interface design is helping libraries to build better websites and portals.

In the ECU Library Usability Study the experience of observing students gave us insights into cognitive processes used to solve a specific problem when seeking information. The students were given a topic with no guidance as to how to arrive at the solution, just advice on where to go for the answer.

The long term goal of the ECU study was to improve navigating around the library website, but it also provided new and useful insights on student learning that will feed back into our approach to providing information literacy classes. What should we include in our learning activities with the students we teach? Do we have the right learning outcomes? This study gave us some very powerful data and challenged the library approach to teaching information literacy. This information led to an examination of relevant learning theories, in particular constructivist learning theories.

Constructivism and constructivist learning theory

Constructivism recognises that each student is individual, and each individual makes their own meaning of the information. This was observed in the usability study. Cooperstein and Kocevar-Weidinger's (2004) article in the journal *Reference Services Review* provides a constructivist theoretical framework to teaching information literacy and provides a basis of a rethinking of our approach at ECU.

An important part of the Usability Study was the de-brief. The students wanted to know how they went, and why some approaches failed to reveal results. This was an extremely valuable learning opportunity for them and for the library staff. One classic problem students had in search construction was to use natural language. In the database search, they typed the whole phrase, rather than break the phrase up into key concepts and connect them with the Boolean AND. This syntax choice meant they found nothing on the topic, despite

spending 15 minutes searching around the Library and web resources. Search syntax or "search strategy" is taught in the library's information literacy classes. This is the concept rather than the skill and the constructivist approach to teaching this would be to give students an activity which demonstrated the problem and then lead them into an explanation of the concept (Cooperstein & Kocevar-Weidinger, 2004). This is exactly what was happening on this occasion, so the library could now look at changing the approach to teaching search strategy.

Online learning and instructional design aspects

The Usability Study also affirmed in our minds that the academic library website is in itself a web-based learning environment. When academic librarians provide information literacy instruction they are also engaging with learners in an online learning environment. Woodard's (2003) article "*Technology and the constructivist learning environment: Implications for teaching information literacy skills*" highlights this fact. An understanding of constructivist pedagogy is crucial for librarians who are creating these information rich learning environments. The problems learners have in negotiating these online environments were observed in the ECU Library Usability Study

The related literature of online learning and constructivist learning environments reveals another wealth of research, and a theoretical framework that librarians can access to help them improve the library website. For example Lefoe's ASCILITE Conference paper (1998) and the cited research of Duffy and Cunningham (1996) points to a rich resource on instructional design and creating online learning environments. Instructional designers and librarians share common ground.

Conclusion

The ECU Library Usability Study provided vital data on web design, usability and accessibility. This led to a redesign of the home page, providing it with a whole new look and feel that has been enthusiastically received. The re-testing in 2006 has focussed attention on problems students have with the site which relate less to design and more to information literacy. For library staff the very act of observation provided an insight into how students learn in the online learning environment of the library website. The usability study methodology was effective and there is much scope for future testing in areas of need.

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