"The websites of Higher Education Institutions are more than merely promotional interfaces with potential students" - Web Accessibility and Usability in a HEI environment

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Abstract

Accessibility and usability are key fundaments a system designer should use in order to produce an effective and efficient website. The task of meeting the needs of user diversity in the modern world should be a high priority to any developer when looking at software development and the graphical user interface (GUI).

This paper discusses research carried out with web focus groups comprising of 23 users at the University College Plymouth St Mark & St John (UCPMarjon) in Plymouth, England. The study adopted a Human Computer Interaction (HCI) approach and discovered a number of flaws in the conceptual model of the UCPMarjon website. Recommendations were made to improve the website and form a new conceptual model that Higher Education Institutions (HEI) should adopt as a baseline for website accessibility.

Keywords

Web Accessibility; Usability; Human Computer Interaction, UK Higher Education

1 Introduction

There is mounting evidence that website designers are neglecting disabled people when creating accessible content for their websites (Disability Rights Commission, 2004). The implementation of the Special Educational Needs and Disability Act (SENDA) has failed to increase HEI website accessibility and many educational websites are still lacking appropriate measures to include disabled people.

The term 'disabled person' covers a wide range of disabilities and health conditions - from a visual impairment to arthritis, cancer, multiple sclerosis, heart disease, depression, Downs Syndrome and diabetes. The Disability Rights Commission (DRC) estimates that there are over 10 million disabled people in Britain alone, with a spending power of around £80 billion (Family Resources Survey 2003-2004).

Mental models are defined as models that people have of themselves, others, the environment and the things that they interact. The mental model of a disabled user differs greatly from that of a normal user and thus must be accommodated for when

designing an interface. They are unable to form a good understand of the perceived actions and visible structure that the interface provides. Increasingly, there is evidence that many HEI websites have failed to adopt a user centric perspective and neglected to identify the different mental models of potential users (Kelly 2002; Kelly, 2004).

This paper critically examines the existing UCPMarjon website and provides a conceptual design of a solution that bridges the gap between what currently exists and meeting the diverse needs of potential users.

2 Previous Studies of Accessibility of HEI websites

The majority of the previous studies undertaken on HEI website accessibility have been carried out by using automated evaluation tools to compare websites against the Web Accessibility Initiative (WAI) Web Content Accessibility Guidelines 1.0 (WCAG 1.0) standards. These have consistently shown HEI websites fail to meet the needs of their users. Table 1 summarises the results of three UK HEI website accessibility studies.

Study	Websites	WAI AA Compliant	WAI A Compliant	Not Compliant	Unknown
Kelly (2002)	163	1.85%	42.94%	54.60%	0.61%
Kelly (2004)	161	5.59%	57.76%	30.43%	6.21%
Witt and McDermott (2003)	180	1.5%	39.00%	58.33%	0

Table 1: Comparison of studies into the accessibility and usability of HEI websites

A variety of reasons have been suggested as to why HEI websites have failed to implement accessibility effectively. There are a three core themes that are identified through current literature:

- Use of unreliable automated evaluation tools
- Lack of understanding of key concepts of HCI
- The WCAG Guidelines are too complex

2.1 Use of Unreliable Automated Evaluation Tools

Research has proven that evaluation tools are unreliable. It has been shown that they can give differing results for the same web pages and are not consistent in reporting accessibility status (Diaper and Worman, 2003).

2.2 Lack of Understanding of Key Concepts of HCI

The automated evaluation tools are only of use when they are used by a web designer who can interpret their results and relate them to the WCAG guidelines (Ivory and Chevalier, 2002).

2.3 The WCAG Guidelines Are Too Complex

The WCAG guidelines are cited as being too theoretical in nature, too dependent on other WAI guidelines, ambiguous, complex, contain logical flaws and hard to interpret (Sloan *et al.* 2006).

3 Accessibility and Usability in HEI and the need for future research

The theories of web accessibility and usability are built upon the interoperability of a large number of web pages which provide a unique GUI and the adoption of a universal usability principle. Schneiderman (2001) states that universal usability 'implies that diverse users with varying language skills, knowledge levels, motivation and computer hardware/software can successfully apply technology to get what they need in life.' It is therefore evident that the use of automated evaluation tools is not enough to determine the accessibility or usability of a website and that further examination is required to support the increasing number of disabled students in Higher Education.

4 Experimental Design and Research Method

The 'Star Model' (Hartson and Hix, 1993) was adopted as the HCI design approach that the study would follow in order to suggest a new conceptual design for the UCPMarjon website. The constant evaluation that the Star Model provides is flexible in its approach and enabled the continuous review of the prototype. It is better suited to the requirements of interactive web systems which have usability as a core focus.

A task analysis was designed to facilitate testing various user cognitive and physical abilities when they came into contact with the UCPMarjon website. This was distributed in the form of a paper booklet to staff and students at UCPMarjon who formed participants of the web focus groups. The task analysis was created to facilitate the development of user scenarios and use cases which would aid to interpret specific flaws in the conceptual model of the UCPMarjon website. It would also allow the creation of a rich picture (Checkland, 1999) which would assist in the understanding of the current UCPMarjon web system. The Use cases would help to build specific functional requirements that will be included in the HEI website GUI to make it accessible and usable.

5 Results

23 participants undertook the task analysis between May and July 2008 including eight users with varying disabilities. 86.96% of all tasks were completed successfully by participants although only 82.50% of the tasks that were executed by disabled tasks were completed effectively. Particular problems were found with the tasks that involved finding or viewing videos that were available on the website. 65.22% of all users failed to locate and observe a video of how to access the College email. Only 12.5% of disabled users who executed the task did so successfully. Users were also unable to find fee information on the UCPMarjon website. One of the tasks required

the recording of fee information for a UK or EU for BA Undergraduate Geography. 26.09% of the focus group did not complete the task.

	All Users (n=23)		Disabled Users (n=8)		Non-Disabled Users (n=15)	
Task	**Frequency**	**Percentage**	**Frequency**	**Percentage**	**Frequency**	**Percentage**
1	15	65.22	7	87.5	8	53.33
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	2	8.70	1	12.50	1	6.67
6	1	4.35	0	0	1	6.67
7	6	26.09	2	25	4	26.67
8	2	8.70	2	25	0	0
9	2	8.70	1	12.50	1	6.67
10	2	8.70	1	12.50	1	6.67
TOTAL	**30**	**-**	**14**	**-**	**16**	**-**

Table 2: Summary of failure to complete task analysis tasks

The results depicted in Table 2 showed that the failure of the tasks by both disabled and non-disabled users was too significant to ignore and that action needs be taken.

Disabled users experienced more problems than non-disabled users. By comparing the ratio of number of failures against sample number from each user type it was able to deduce that a disabled user experienced 1.75 failures per user and non-disabled users 1.06 failures per user. This stressed that there was a great necessity to improve the accessibility of the UCPMarjon website.

Evidence suggested that the website had obstacles to accessibility and usability. There appeared to be problems with structure, navigation and accessibility of both the website and the videos that are contained within it.

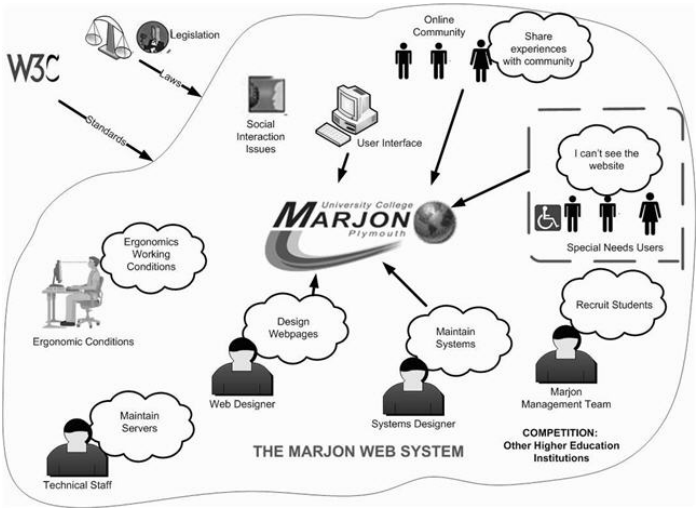

Figure 1 – A Rich Picture of the current UCP Marjon website

It is possible to gain a better understanding of the problem situation that users presently have when using UCPMarjon by conveying their plight in the form of a rich picture (Figure 1). It can be deduced from the rich picture that at present, disabled users seem to have particular problems with the UCPMarjon website. This is not only evident at the UI level, but also when viewing videos.

6 Discussion

The UCPMarjon website needs to be developed to cater for the diversity of users that will use the system. Usability and accessibility principles should be fundamental to the conceptual model of any web design and should be built in where possible to provide an interface which affords direct manipulation (Schneidermann, 1983).

To accommodate this, user stories were sourced from the user experience sheets of participants who took part in the web focus groups. These resulted in the creation of two top level use case requirements lists as shown in Table 3.

Requirement	Use Case
For all users to be able to access and use the GUI of UCPMarjon website's website	Create accessible and usable web pages
For all users to be able to access and view uploaded videos on the UCPMarjon website	Make the videos of UCPMarjon website accessible to all users

Table 3: Top level use case requirements lists for making the web pages and videos more accessible and usable

The Use cases requirements lists have therefore highlighted a need for changing the GUI of the UCPMarjon website and improving access to the videos by adding functionally to incorporate special needs users.

Recommendations were made to improve the UCPMarjon website in the light of the use case requirements list which can be viewed in Table 4.

Recommendation	UCPMarjon GUI	UCPMarjon Videos
1	Provide multiple cascading style sheets	Add closed caption subtitles/captions
2	Allow for the increase of relative font size	Offer a downloadable transcript of videos
3	Optimise website structure	Offer a descriptive audio only option
4	Develop web pages using relative sizes	Add a sign language video to run in parallel with videos
5	Use metaphor only for cognitive assistance	
6	Use Verdana Font	
7	Offer the use of access keys	
8	Use descriptive alternative text for images	
9	Use headings for structure	
10	Use table headings	
11	Use a breadcrumb	

12	Use simple URLs	
13	Use scannable text	
14	Design for multiple browsers	
15	Create menu bar with semantic organisation in mind	
16	Use Google gisting services	
17	Provide online help pages	
18	Use form fills that are grouped	
19	Provide Instant user feedback	

Table 4: Recommendations to improve accessibility and usability of the UCPMarjon website GUI and videos

These were suggested as a baseline that HEI should adopt for their website accessibility and usability.

7 Conclusion and the Future

The research sought to investigate the subject of the accessibility and usability of HEI websites, using the UCPMarjon website as a basis for investigation. It was found by means of a task analysis that there were problems with structure, navigation and accessibility of both the website and the videos that were contained within it. As a result a number of recommendations have been made to improve accessibility and usability: 19 for the UCPMarjon GUI and 4 for the UCPMarjon videos. These are the basis for a conceptual model for HEI to adopt for website accessibility and usability.

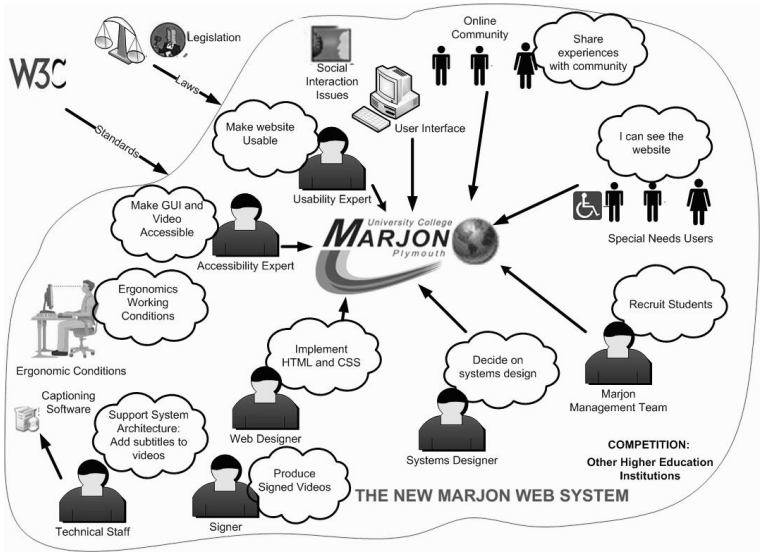

Figure 2 – The Updated Rich Picture of the UCP Marjon website

As with most GUIs, the process of improving the conceptual model is a never ending one. It is suggested that the conceptual model for UCPMarjon be constructed as a

website and undergo further evaluation as stated by the Star Model that was adopted as the basis for this study.

As a basis for further evaluation it is suggested that the updated rich picture of UCPMarjon website (Figure 2) be adopted as a starting point.

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