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WEB ACCESSIBILITY: AN INVESTIGATIVE & COMPARATIVE STUDY OF THE UK & US UNIVERSITY WEBSITES

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Abstract: Enabling a Web site to meet the needs and requirements of individuals with disabilities is a concern for all businesses. The requirement and necessity to make sure electronic accessibility for all E-learners is now becomes an ever increasing practical, social, moral, and legal obligation in today's world. The need and access of the Internet is becoming a requirement for full participation in 21st century but a spacious number of the people using Internet or E-learners are still remains inaccessible in the result of failure to follow guidelines when designing Web sites to many parts of the disabled community. In fact, by the growth of E-Commerce and E-learning, there are so many legal issues currently raised but one of the burning and least discussed issues is that of *Web Accessibility*. The failure of Web accessibility is the major reason to keep out a significant and substantial amount of world's population from fully take part and take advantage and benefits in the increased used and trust on E-Commerce and E-learning.

1. Introduction

In the education environment many colleges, universities and training establishments are keen to exploit the e-learning environment. In the current population there are significant numbers that are visually impaired. These people tend to be excluded from the socially popular vehicle for entertainment, shopping and more importantly education. That is the use of the World Wide Web as a mechanism by which those services and facilities are provided. This matter is of so much concern that governments and specialized bodies such as Royal National Institute for Blind (RNIB) have produced recommendations. The challenge is now how best to meet this rising demand while ensuring that the nature and types of learning respond to needs in a cost-effective manner. On 25th September 2001, European commission adopted a communication on improving the accessibility of public Web sites and their content. The aim is to make web sites more accessible to people with disabilities. Visually impaired people, 'read' web pages using software tools known as screen readers, which generate speech and/or refreshable Braille output. Even the simplest web pages generally feature images and use tables to format their navigation menus and content. This creates a number of problems for people with visual impairments, as they cannot see the images and their screen readers can have serious problems interpreting tables, animation and JavaScript.

This paper focuses on the Web sites of the UK and US universities and provides a review on the current effectiveness of Web-mediated instructional opportunities for student with disabilities. The Disability Rights Commission says that One in seven people in the UK suffer some form of disability and many people experience some loss of sight and manual dexterity as they

get older, (System Concepts, 2004). On the other hand the rapid growth of the Internet in world has changed the ways people communicate, teach and learn. Most of the educational materials are place online now-a-days. The educational Web designers play an important role in spreading this information over the Internet throughout the world. It is important that educators consider the social, political and educational implication of disability.

Most of the Educators, Web developers and designers often do not consider this large and spacious implication of accessibility even most of the teachers in schools and university campuses do not think about disability as a larger issue and think it as the responsibility of the special education. The issue becomes more critical when education and learning goes online over the Internet and an entire new range of possibilities and limitations occur. The challenge of designers of Web-based educational materials is to create Web sites that are accessible to every one.

2. Background Study to Web accessibility, bringing the organizations

World Wide Web Consortium (W3C) started in October 1994 and was created by Tim Berners-Lee, director of W3C and inventor of the Web at European organization for Nuclear Research (CERN) research centre in Switzerland with support from Defence Advance Research Project Agency (DARPA) and European Commission maintains World Wide Web standards. It is a forum which creates, reviews, and approves the technical specifications for the languages and protocols which form the architecture of the World Wide Web for information,

commerce, communication and collective understanding and also organized as a member organization to standardize the Web. IBM, America Online, Microsoft, Apple, Adobe, Macromedia and Sun Micro-Systems are the well known members of W3C, (W3C, 2005a). INRIA (Institute National de Recherche en Information et Automatique) became the first European W3C host in April 1995, (W3C, 2005b). The operation of W3C is jointly administrated by MIT Computer Science and Artificial Intelligence Laboratory (CSAIL) in the USA, the European Research Consortium for Information and Mathematics (ERCIM) headquartered in France and Keio University in Japan. The main task of W3C is to lead the World Wide Web to its full potential by developing protocols and guidelines that ensure long-term growth for the Web make sure the accessibility of the Web to all users through out the world over the Internet regardless any disability, physical limitations and culture. The Web Accessibility Initiative (WAI) is a working party developed by W3C which is supported by U.S. Department of Education's National Institute on Disability and Rehabilitation Research, a non-profit research, training and public policy centre for disable people, (WID, 2005), European Commission's Information Society Technologies Program, Canada's Assistive Devices Industry Office HP, IBM, Microsoft Corporation, SAP, Verizon Foundation and Wells Fargo.

The American Disability Act is a federal law passed in July 1990, (Disabilities Act , 2003) that protects individual from discrimination with respect to employment, public service, public accommodation, services operated by private persons and telecommunication services. The initiative is specially designed to increase the access of the assistive technologies and increase the ability of the disable people. The Special

Educational Needs and Disability Act 2001 (SENDA) came into force on 1 September 2002, (SENDA, 2002) which covers a range of accessibility issues in educations and introduces that the right for disabled students not to be discriminated against in education for those enrolled on courses provided by responsible bodies. According to the Act, Web sites may also be actionable under the Human Rights Act 2002 and may also apply to the Web sites of universities in education. Net Disabilities, the Barrier in the Way of Web Accessibility People can have the combinations of different disabilities.

The term "disability", *a condition that curtails to some degree a person's ability to carry on his normal pursuits. A disability may be partial or total, and temporary or permanent*, (Glossary 2005) is used very generally and can direct several problems when accessing the Web. Most of the studies find that about one fifth (20%) of the population in world has some kind of disability, (Baohman, 2003) Therefore, enabling a Web site to meet the needs and requirements of individuals with disabilities is a concern for all businesses.

The major categories of disability types are; Visual (Blindness, low vision, color-blindness), Hearing Impairments (Deafness), Motor (Inability to use a mouse, slow response time, limited fine motor control), Cognitive (Learning disabilities, distractibility and inability to remember or focus on large amounts of information)

3. Accessibility Track in View

To find out the current level of accessibility of the Websites of UK and USA universities, accessibility tests have been conducted. All these accessibility tests have been conducted for the top most university's Web sites of United State of America and United Kingdom according to the standard and checklist developed by World Wide Web Consortium (W3C) which is the international standard for Web accessibility. The reason behind of selection for the universities of these countries is that both of the countries are rich in educational institutions as compare to any developed country and the usage of Websites significantly used in these countries is higher than other developed countries.

4. Testing and Validation of Web site

Testing and validation of the Web site plays an important role in Web accessibility. Always test and validate your site before posting on the Internet. If the site is not accessible and has not been tested and validated properly there is possibility to lose millions of visitors. Testing and validation of the Web site can be performed either by a quick review or by a thorough review. Different tools are available for testing and validation of the Web site. Hermish which is an Evaluation Tool for Web Content Accessibility designed for helping bring the Web site up to required standards outline by W3C Priorities 1, 2 & 3 and Section 508 was used for this research. The compatibility of the Website with HTML browsers and other browsers has been checked by the same tool. As readability is one of the important issues of the Web accessibility. The reading level should be considered in developing a Web page. Slang terms and other traditional language should not be used. WCAG 1.0 suggests using a paragraph's first sentence to convey it's subject to make easy the readability of the Web site. Gunning Fog Index is a formula that produces a readability grade of the Web site. The entire tests have been conducted according to that formula. The formula is

Gunning Fog Index = [(number of words / number of sentences) + "difficult words"] x 0.4, (Gunning Fog Index, 2005).

5. The Area & Reason behind Failure Websites

The W3C Priorities 1, 2 & 3 have number of sections but particularly we are interested in the sections given below which are the main reason behind the failure of websites.

Priority 1

[Section 1.1] *Provide a text equivalent for every non-text element (e.g., via "alt", "longdesc", or in element content).* This includes: *images, graphical representations of text (including symbols), image map regions, animations (e.g., animated GIFs), applets and programmatic objects, Ascii art, frames, scripts, images used as list bullets, spacers, graphical buttons, sounds (played with or without user interaction), stand-alone audio files, audio tracks of video, and video.*

[Section 12.1] *And if you use frames, tile each frame to facilitate frame identification and navigation.*

[Section 6.3] *And if you use applets and scripts, ensure that pages are usable when scripts, applets, or other programmatic objects are turned off or not supported. If this is not possible, provide equivalent information on an alternative accessible page.*
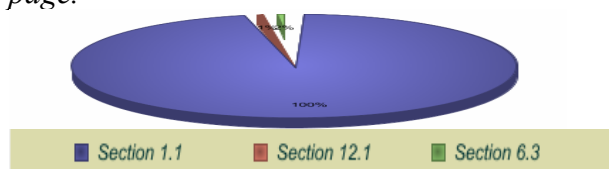

Figure 1: Graphical View of Failure Sections of Priority1

Priority 2

 [Section 3.2] *Create documents that validate to published formal grammars.*

[Section 7.4] *Until user agents provide the ability to stop the refresh, do not create periodically auto-refreshing pages.*

[Section 7.5] *Until user agents provide the ability to stop auto-redirect, do not use markup to redirect pages automatically. Instead, configure the server to perform redirects.*
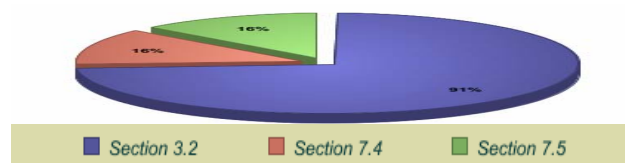

Figure 2: Graphical View of Failure Sections of Priority2

Priority 3

[Section 4.3] *Identify the primary natural language of a document.*

[Sec. 11.3] *Provide information so that users may receive documents according to their preferences (e.g., language, content type, etc.)*

[Section 10.4] *Until user agents handle empty controls correctly, include default, place-holding characters in edit boxes and text areas.*
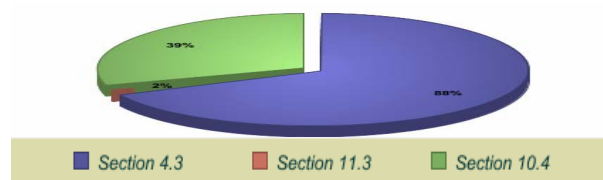

Figure 3: Graphical View of Failure Sections of Priority3

6. Comparative Accessibility Report of Universities Websites in USA & UK:

It is important to keep in mind that the number of universities in USA is bigger than the number of universities in UK. Therefore the following comparison is not the final one for both countries. The following result is based on the top most 128 universities of each country.

Accessibility result of Universities Websites in USA
Number of total Websites checked for Accessibility Standard from USA = 128

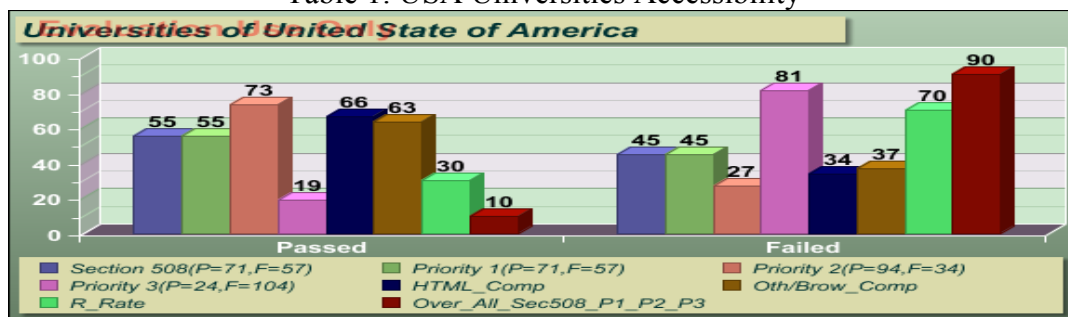|	Sec. 508	Priority 1	Priority 2	Priority 3	HTML	Other_Browsers	Readability_Rate	Over_All
Pass	71 (55%)	71 (55%)	94 (73%)	24 (19%)	(66%)	(63%)	(30%)	10%
Failed	57 (45%)	57(45%)	34 (27%)	104 (81%)	(34%)	(37%)	(70%)	90%

Table 1: USA Universities Accessibility

Figure 4: Graphical view of USA Universities Accessibility

Accessibility result of Universities Websites in United Kingdom
Number of total Websites checked for Accessibility Standard from UK = 128

	Sec. 508	Priority 1	Priority 2	Priority 3	HTML	Other_Browsers	Readability_Rate	Over_All
Pass	97 (76%)	97 (76%)	98 (77%)	44 (34%)	(68%)	(60%)	(24%)	30%
Failed	31 (24%)	31 (24%)	30 (23%)	84 (34%)	(32%)	(40%)	(76%)	70%

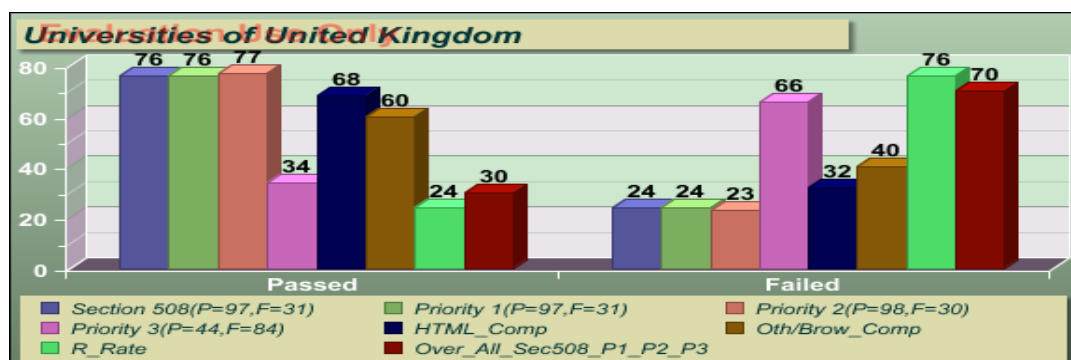Table 2: UK Universities Accessibility

Figure 5: Graphical view of UK Universities Accessibility

	Sec. 508	Priority 1	Priority 2	Priority 3	HTML	Other_Browsers	Readability_Rate	Over_All
UK	76%	76%	77%	34%	68%	60%	24%	30%
USA	55%	55%	73%	19%	66%	63%	30%	10%

Table 3: UK & USA Universities Comparative Accessibility Result
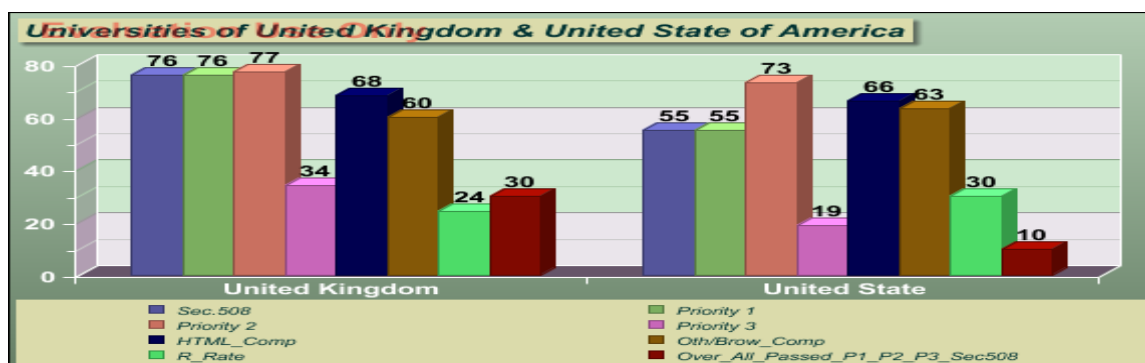

Figure 6: Graphical view of UK & USA Universities Comparative Accessibility Result
From the above results and statistics we found that the result for Section 508, Priority 1, 2 and 3, in UK universities is 20% better as compare to United State of America.
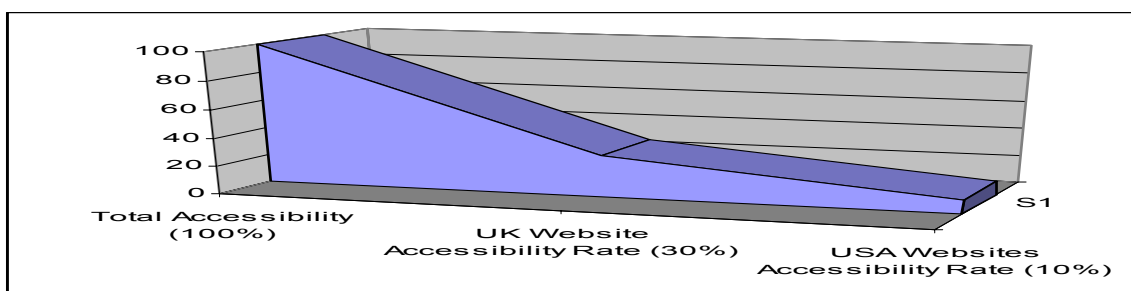

Figure 7: Graphical View of Comparative Accessibility Achieved by UK and USA

Conclusions:

The large and significant number of the disable people has the equal rights to access the modern technologies of the world and they should not be discriminated in terms of accessibility for E-learning and E-commerce. The educational institutes, government and public sectors have the basic responsibility to provide equal access to the modern technologies for all E-learners regardless any disability and any physical limitations, no matter where they are based. The achievement of total accessibility is really difficult because of so many problems like different disabilities, language barriers, and hardware and software inconsistencies. The significant number of Websites is considered either partially or totally inaccessible to people with disabilities.

Considering the given importance of academic institutions and their responsibilities to facilitate the needs for all

users, my results prove otherwise. The results of this survey indicate that 80% educational institutions failed to achieve the standard set by the W3C. It has been noted that most of the institutions failed to appreciate the importance of 'Web Accessibility' approach. The modern world and the educational institutions are needed to play his role more seriously. The need for electronic accessibility is now becomes a practical, moral, social and legal obligation in today's modern world.
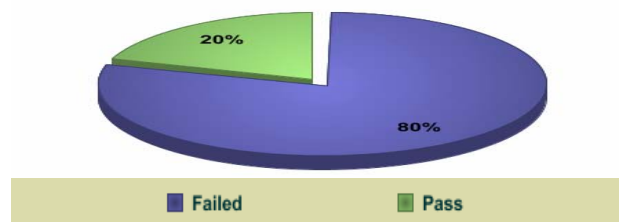

Figure 8: View of Overall Accessibility

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