



**Learner
Support
Services**

The University of Bradford Institutional Repository

<http://bradscholars.brad.ac.uk>

This work is made available online in accordance with publisher policies. Please refer to the repository record for this item and our Policy Document available from the repository home page for further information.

To see the final version of this work please visit the publisher's website. Available access to the published online version may require a subscription.

Author(s): George, Sarah, Clement, Ellie, Hudson, Grace and Atif, Mohammed

Title: Auditing the accessibility of electronic resources

Publication year: 2014

Link to original published version:

<http://www.york.ac.uk/media/abouttheuniversity/supportservices/informationdirectorate/documents/northumbriageneraldocs/10th%20Northumbria%20Conference%20Proceedings.pdf>

Citation: George, S., Clement, E., Hudson, G. and Atif, M. (2014). Auditing the accessibility of electronic resources. In: Hall, I., Thornton, S. and Town, S. (eds.). Proceedings of the 10th Northumbria International Conference on Performance Measurement in Libraries and Information Services. University of York, July 22-25th, 2013. pp. 95-104.

Copyright statement: © 2014 The Authors and the University of York.
Reproduced in accordance with the publisher's self-archiving policy.

Auditing the accessibility of electronic resources

Sarah George¹, Ellie Clement, Grace Hudson and Mohammed Atif, JB Priestley Library, University of Bradford

Introduction

Since the 2001 Special Educational Needs and Disability Act (SENDA, 2001), academic libraries have had a legal duty to provide all students with information in a form accessible to them, an obligation strengthened by the 2010 Equality Act (c15). Crucially, the latter duty covered readers with all kinds of impairments, not just visual impairment, so covers a huge range of needs for an enormous number of individuals. Libraries have put a huge amount of time and effort into providing documents in accessible format (alt-format) but obviously it is preferable for both libraries and readers if the documents are accessible as supplied from the publisher. Electronic resources have the potential to address many of the accessibility needs of our readers, but concerns have been growing in the HE sector (see, for instance, JISCTechdis 2013) that the way in which e-resources are delivered actually renders them less accessible in some cases. This paper describes a project undertaken by the University of Bradford library to systematically assess the accessibility of our electronic resources, and gives recommendations for others wishing to do the same.

Print impairment and electronic resources

Ten years ago, print impairment was mostly equated with visual impairment: in the pioneering special issues of the journal *Library Hi Tech* on Accessibility of web-based information resources for people with disabilities from 2002, 13 of the 18 papers on accessibility were tagged with “Blind People” as a keyword, and none with dyslexia, motor impairment or any other disability. Dyslexia merits a single mention in the entire two issues (*Library Hi Tech* 2002). Since then, the range of impairments recognised as causing difficulties in using printed resources has broadened radically, including a range from dyslexic spectrum disorders to motor and tactile disorders through to fatigue and multiple sclerosis. This list is by no means exhaustive but reflects the range of needs encountered by University of Bradford library staff. Our awareness of the spectrum of print impairment has been raised in the last few years by Learner Support Profiles (LSPs²). Subject librarians receive LSPs for all new students in their supported areas, raising our awareness of the range of invisible impairments and giving us a broader appreciation of the variety of barriers encountered by our students.

Provision for visually impaired readers has largely moved on from Braille and large format printed books. Electronic resources provide options for zooming to font size that is comfortable for the reader, changing font and background colours to high contrast and reflow of the text to remove the need for horizontal scrolling. Text can be read out loud by a number of free and proprietary software packages, and PDFs have a built-in read out loud function.

¹ Corresponding author, s.george@bradford.ac.uk

² Learner Support Profiles are personalised statements prepared by the Disability Office in conjunction with all students referred to them, detailing the type and level of additional support or individual adjustments required to create equality of learning opportunity in areas such as lectures, assessments and library services

However, a wealth of research carried out in the past few years by many prominent medical practitioners may be considered serious. Any game, in fact, besides being entertaining, also hides one or multiple purposes. In such a sense, games are playing the important role of edutaining, rather than solely entertaining an individual relationship with their players, providing their benefits on a single-player basis, thus usually and pervasively computing, more can be done that can be beneficial for society as a whole [Weiser et al.]. Teamwork among players could produce results that are more significant than those that would be achieved by individual players.

Figure 1: HTML full text showing background colour change using AtBAR

However, a wealth of research carried out in the past few years by many prominent medical practitioners may be considered serious. Any game, in fact, besides being entertaining, also hides one or multiple purposes. In such a sense, games are playing the important role of edutaining, rather than solely entertaining an individual relationship with their players, providing their benefits on a single-player basis, thus usually and pervasively computing, more can be done that can be beneficial for society as a whole [Weiser et al.]. Teamwork among players could produce results that are more significant than those that would be achieved by individual players.

Figure 2: HTML full text showing background and font colour change using AtBAR

impairment, so covers a huge range of needs for an enormous number of individuals. Libraries have put a huge amount of time and effort into providing documents in accessible format (alt-format) but obviously it is preferable for both libraries and readers if the documents are accessible as supplied from the publisher. Electronic resources have the	receive a personalised statement of their learning needs in areas such as lectures, assessments and library services. Subject librarians receive these for all new students in their supported areas, raising our awareness of the range of invisible impairments and giving us a broader appreciation of the variety of barriers encountered by our students.
---	--

Figure 3: PDF before reflow

range of needs individuals. amount of time and in accessible	receive a personalised statement of learning needs in areas such as assessments and library services librarians receive these for all new
---	--

Figure 4: PDF zoomed to 400%

individuals. Libraries have put a huge amount of time and effort into providing documents in accessible format (alt-format) but obviously it is

Figure 5: PDF zoomed to 400%, with reflow

Numbers of students with dyslexic spectrum disorders have hugely increased in recent years, and now constitute the largest single group of print-impaired readers. This is partly due to improved diagnosis and recognition: the University of Bradford screens all new students for dyslexic disorders, with many receiving the diagnosis for the first time. Working with our disability services, many readers discover that they read best with a particular font, or combination of font and background colours. The latter can be achieved by coloured overlays or photocopying onto coloured paper, but electronic resources have the potential to allow far more control over font type and colour variation.

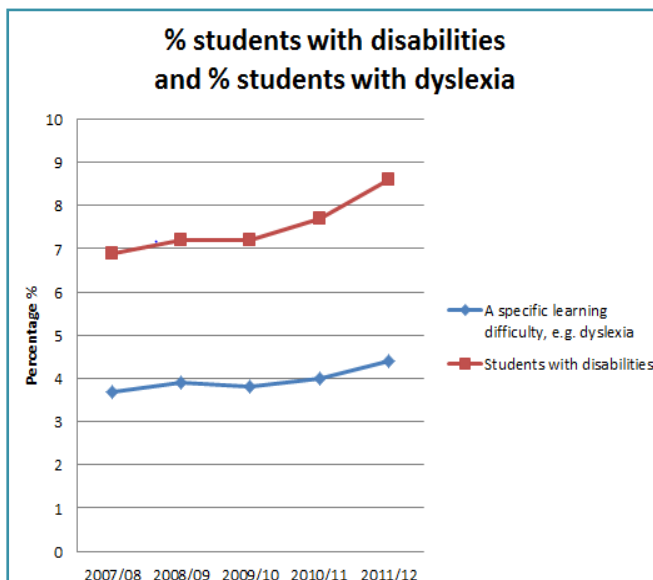


Figure 6: Number of students with dyslexia as a proportion of all disabled students at the University of Bradford, 2007-12

Other print impairments may come with the sheer weight and bulk of printed material. Readers with motor impairments often complain of the difficulty of handling and manipulating printed material, whereas those with fatigue disorders or Multiple Sclerosis can find that the effort of carrying their quota of library books is a significant obstacle to using them (Mann, 2013). Readers with mobility impairments can find the effort of moving around a large university library and reaching books from high shelves to be a major barrier (Mann, 2013). All of these can potentially be solved by accessing resources electronically.

We are increasingly finding that students arrive at university with coping mechanisms already in place: they have their own hardware with specialised software and personalised settings. If electronic resources work on the students' own devices then they are able to access them entirely

independently as any other student would, whereas they may need significant assistance with printed material.

Reliance on electronic resources

University libraries are increasingly reliant on electronic resources, especially for access to journals. The “big deals” offered by many publishers mean that libraries have access to tens or hundreds of times the numbers of journals titles they ever had in physical form. In tandem comes the increasing pressure on space in university libraries, where the demand for study space often means that there is less shelf space (vanDuinkerken, 2012; Yang, 2013). The obvious solution to these pressures is to discard holdings of printed journals which are also held electronically.

At the University of Bradford library, our printed journal holdings have decreased from over 6000m in January 2012 to just under 1300m (consisting of some 1500 titles) in July 2013. At the same time, our holdings of electronic journals have risen from 15,000 titles in 2009 to over 46,000 subscribed titles in 2013, with thousands more titles freely available. This is not an uncommon pattern across the whole sector, and has profound implications for student study patterns. Even in 2009, a student choosing to use only printed journal resources would miss a significant part of the corpus of knowledge on their subject. In 2013, using only printed journals is simply not a viable option, so libraries must ensure that their electronic resources are fully accessible to all users.

Problems with electronic resources

There is obviously great potential for electronic resources to address a huge range of accessibility needs, but unfortunately this potential is often not realised. The primary problem is Digital Rights Management (DRM). DRM is employed by publishers to prevent unauthorised copying and dissemination of their copyrighted material, by preventing saving a PDF or limiting the percentage of a work that can be printed or copied. Unfortunately, it is well documented (Kramer, 2007; Turro, 2008) that these legitimate concerns often interferes with inbuilt accessibility features or specialist software, for instance preventing read out loud from working on PDFs. Another way accessibility can be compromised is through corporate styling within the electronic resources which may prevent colour or font changes. Taken together, these measures can render a work completely inaccessible: if the styling on an ebook prevents background colour change, and only 10% can be printed onto coloured paper, then a dyslexic student may only be able to read that 10% whereas a non-dyslexic student can read the whole work online.

In addition, the enhanced multimedia aspects of electronic journals, whilst welcomed by many readers, can cause problems for others. Advertisements, especially with animation, can cause an unwelcome distraction to readers with a whole range of conditions from ADHD to autistic spectrum disorders and Obsessive Compulsive Disorder who find it more difficult to ignore irrelevant content (Winn, 2008). Given the reliance on e-resources discussed above, we must find ways of rendering them accessible to all readers.

Previous work

Accessibility of web based information has been a concern since the original Web content accessibility standards in 1999 (W3C, 1999). Database and electronic resource specific studies include the Association of Specialized and Cooperative Library Agencies (ASCLA 2010) in the US who

compiled data in a wiki on database accessibility from 2008 and 2010, mainly taking statements from vendors websites.

Smith (2011) carried out work on accessibility on the most popular of the electronic resources used by the Open University, in their work supporting around 12000 students with disabilities. The results of this study were passed onto JIBS to influence their work with publishers.

The publishing industry through Editeur collaborated with WIPO and the Daisy Consortium to publish the *Accessible publishing Best practice for Publishers guidelines* (Hilderley, 2013), which outline the key ways publishers can make their text accessible by combining structure, content and appearance, as well as highlighting some of the ways that the accessibility of the documents can be impaired (including by use of DRM, and page image PDFs etc.).

In addition to the formal studies outlined above, there are several networks where regional groups of university libraries collaborate to share good practice on accessibility issues. One of the authors (George) is a member of one of these, the Open Rose Group (University of Sheffield, 2013). Other networks include CLAUD in the south and southwest (Oxford Brookes University, 2009), ALIS in Wales (ALIS Wales, nd) and SCURL Special needs group in Scotland (Scottish Confederation of University and Research Libraries, 2012).

The electronic resources accessibility audit

In January 2013, the University of Bradford invited bids for a fixed number of paid graduate internships. These internships lasted 10 weeks and had to undertake a specific project. The library bid for an intern to undertake a systematic audit of electronic resources, and the audit framework was drawn up by the disability liaison librarian, the electronic resources librarian and one of the subject librarians (George). The job of the intern (Asif) was to test our most used electronic resources for each of 30 accessibility measures, such as read out loud, colour change and keyboard-only navigation. These measures are listed in full in appendix 1. Each of the measures were tested, where applicable, on the home page and navigation of the resource, the full text of articles in HTML format and the full text in PDF format, both read online and downloaded. The exercise was repeated for four browsers: Internet Explorer, Google Chrome, Mozilla Firefox and Webbie (King, 2013), a text-only browser. The results were recorded on a spreadsheet, with one sheet for each resource.

We tested only free software, mainly the inbuilt accessibility features of the PDFs and the AtBAR Lite (Wald and Draffen, 2011). We wanted our results to be fully reproducible by students wherever they were located, so programmes such as Texthelp³, which is networked on the University of Bradford student machines, were not used.

Initial findings of the project

The findings of the project are still being examined, but a few early results stand out. Most notably, as we feared, the accessibility features in PDFs are often disabled. Many downloaded PDFs lack the menu bar, which prevents use of accessibility features.

³ <http://www.texthelp.com>

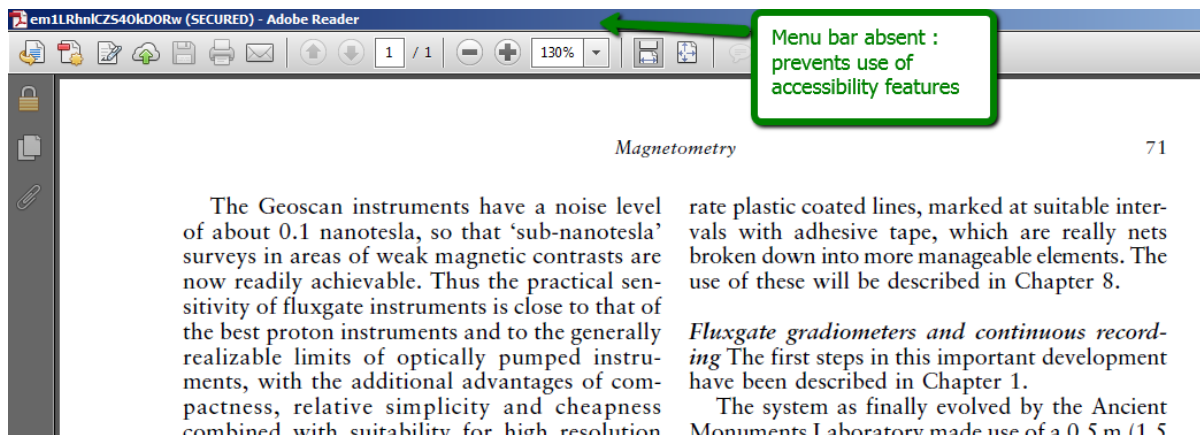


Figure 7: Downloaded PDF lacking menu bar

However, this can often be circumvented if the PDF reader has been opened previously in the session and accessibility settings changed. These changes will usually carry over to the downloaded PDFs.

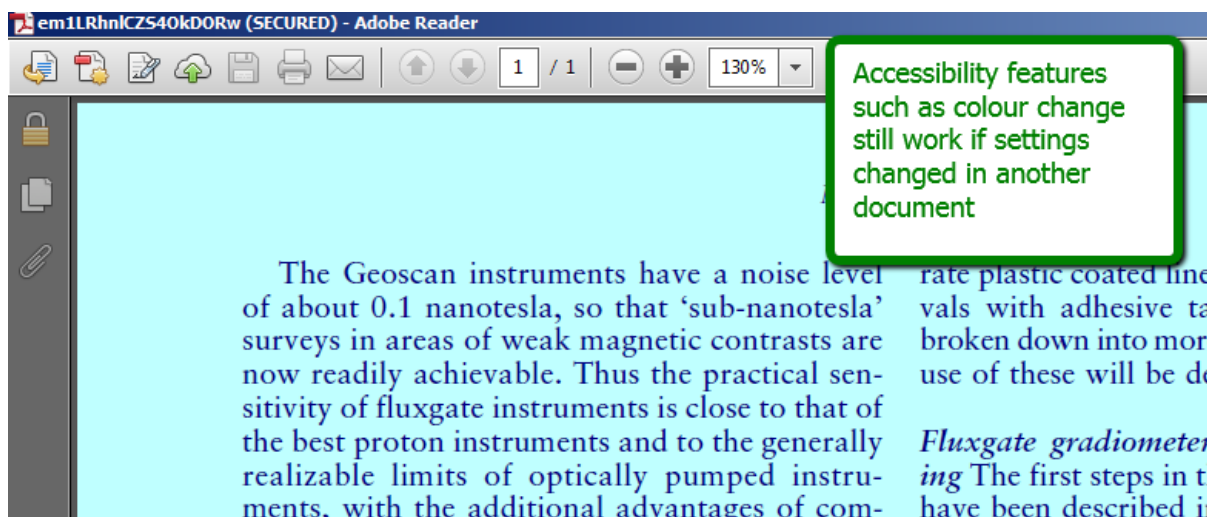


Figure 8: PDF reflecting changes made in another document

Reflow works in very few cases, with the Nature journals being the only major publisher examined where it works consistently. Usually when the reflow option is chosen all the spaces between the words are eliminated, rendering the document unreadable. In some cases, using reflow blanks the entire document.

reduction of the central metal ion and various oxidation and reduction of the ligands, and the processes involve both the central atom and the ligand [21,22]. The spectroscopic and electrochemical techniques provide an excellent approach for studying the redox behavior and the influence of the chromophores in many types of metal complexes [21–25]. The redox

Figure 9: Reflow eliminating spaces between words.

In the most extreme cases, and with some older digitisation, the PDF is a page image rather than text, and no accessibility features will work apart from the zoom (Torro, 2008). These instances we can only assume are not malicious but just showing a lack of awareness of accessibility issues.

The AtBAR, which was used to change the colour of font and background, is often disabled when reaching the HTML full text, presumably by DRM. Of the browsers tested, Google Chrome was the most successful in maintaining the usability of the AtBAR. Even when the AtBAR colour change was not disabled, it sometimes caused major changes to the structure of the page, causing the full text content to disappear off the bottom of the page.

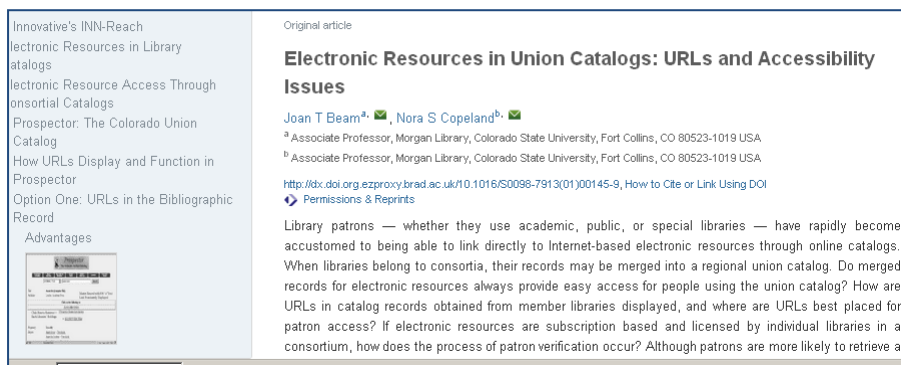


Figure 10: Full text HTML before colour change

Recommendations for further work

The audit described in this paper is a very simple, if time-consuming process, and we would urge other institutions to repeat and build on this work. The requirements are simply a literate person with an internet-enabled device. The Graduate Intern recruited for this project (Atif) had no prior knowledge of library resources beyond that acquired in the course of a literature-based degree, and received a single day of training before undertaking the project. This work could easily be undertaken by, for instance, frontline staff in quiet periods.

There is considerable scope for expansion on this project, testing on more resources using more criteria. Since we started this project the AtBAR has introduced the overlay function, which performs much the same function as the colour change, raising the question of whether this will allow colour change without the problems raised above. There are many other sources of free assistive software so these could be used to test the same criteria as in this study.

The study also focussed on solely PC desktop hardware/software, but there are many other platforms out there. Mobile devices, iPads, ebook readers etc. enable very different zoom technologies which may offer greater flexibility to students.

Conclusions

Alistair McNaught from Techdis starkly lays out the challenge to library staff in a post on his blog:

“Library staff have been pretty passive about this up to now but I suspect it's going to change sometime soon - it only takes one learner to sue one institution for one inaccessible ebook platform and there will be a scramble for platforms with decent guidance on their accessibility features”
(McNaught, 2013, quote used with permission)

We feel that with increasing reliance on and complexity of electronic resources this issue is likely to increase in prominence. Students paying a higher fee regime are more likely to demand that resources be fully accessible “out of the box” without them having to make alternative format requests for every item they want to read an article.

We are however ultimately at the mercy of the publishers, databases and software suppliers. We need to stop being passive and open the conversation on accessibility with all our suppliers. Libraries and publishers will need to work together to address or preferably anticipate these needs before they arise.

descriptions useful?								
Are the images described in the text?								
Can the images be switched off?								
Multimedia								
Is multi-media content captioned?								
Are there transcriptions of the content?								
Animations								
Are there animations on the site?								
Is there advertising on the site?								
Can animations be switched off?								
Font								
Can font size be changed?								
Can font be changed to Arial, Calibri, Comic Sans?								
Can text colour be changed?								
Colours								
Can background colour be changed?								
Is there sufficient contrast?								
Are link colours clear?								
PDF functions								
Is the text readable or is it an image?								
Does the read out loud function work?								
Does reflow work?								
Resolution								
Change the resolution to 640x480 and 16-bit colour: Do the main functions still								

work?								
Change the resolution to 1024x768 and 24-bit colour: Do the main functions still work?								

Reference

ALIS Wales (nd) *About us*. Available from <http://www.alis-wales.ac.uk/en/index.shtml> Accessed 30th June 2013

ASCLA (2010) *Accessibility to library databases and other online library resources for people with disabilities* Available from; http://ascla.ala.org/toolkit/index.php?title=Accessibility_to_Library_Databases_and_Other_Online_Library_Resources_for_People_with_Disabilities Accessed 15th August 2013

Equality Act 2010 (c15) London: HMSO

Hilderley, S. (2013) *Accessible Publishing: Best Practice Guidelines for Publishers. Version 3.1*. Daisy Consortium, Editor, WIPO. Available from http://www.editeur.org/files/Collaborations/Accessibility/WIPO_v3.html. Accessed 30th June 2013

Horwath, J. (2002) "Evaluating opportunities for expanded information access: a study of the accessibility of four online databases", *Library Hi Tech*, 20 (2), pp.199 – 206

JISC Techdis (2010) *Accessible Publishing: Best practice guidance and case studies*. Available from http://www.jisctechdis.ac.uk/techdis/resources/detail/Accessible_Publishing_Best_practice_guidance_case_studies. Accessed 30th June 2013

JISC Techdis (2013) *E-books and Accessibility Ugly Duckling or Adolescent Swan?* Available from <http://www.jisctechdis.ac.uk/techdis/events/detail/2013/ebook13022013>. Accessed 30th June 2013

King, A. (2013) *Webbie: the free web browser for blind and visually-impaired people*. Available from <http://www.webbie.org.uk/index.htm> . Accessed 30th June 2013

Kramer EF (2007) Digital Rights Management: Pitfalls and Possibilities for People with Disabilities. *JEP: Journal of Electronic Publishing* 10(1). DOI <http://dx.doi.org/10.3998/3336451.0010.106>

Library Hi Tech (2002) *Accessibility of web-based information resources parts 1 and 2* (Volume 20, issues 2 and 4). Available from <http://www.emeraldinsight.com/journals.htm?issn=0737-8831>. Accessed 30th June 2013

Mann, K. (2013) *Disabled students' perceptions of library services*. Unpublished Graduate Trainee Project, University of Bradford Library

McNaught, A. (2013) Food for thought - accessible e-book platforms? | Jisc TechDis Blog . Available from <http://www.scoop.it/t/inclusive-teaching-and-learning/p/4004876207/food-for-thought-accessible-e-book-platforms-jisc-techdis-blog> . Accessed 30th June 2013

Oxford Brookes University (2009) *About CLAUD*. Available from <https://wiki.brookes.ac.uk/display/CLAUD/About+CLAUD> . Accessed 30th June 2013

Scottish Confederation of University and Research Libraries (2012) SCURL Special Needs Group. Available from <http://scurl.ac.uk/what-we-do/working-groups/scurl-special-needs-group/> Accessed 30th July 2013

Smith, G. (2011) Supporting distance learning students with disabilities. *SCONUL Focus* 53:39-43
Special Educational Needs and Disability Act 2001. London: HMSO

Turro, M.R. (2008) Are PDFs accessible? *Information Technologies and Libraries* 27(3): 24-42

University of Sheffield (2013) *The Open Rose Group*. Available from <http://www.shef.ac.uk/library/services/openrose> Accessed 30th July 2013

vanDuinkerken, W. (2012) Lessons learned: can a resource in common work? *New Library World* 113 (1/2) pp.65-76

W3C (1999) *Web content accessibility guidelines 1.0*. Available from : <http://www.w3.org/TR/1999/WAI-WEBCONTENT-19990505/>. Accessed 15th August 2013

Wald, S. and Draffan, E.A. (2011) *AtBAR*. Available from <https://www.atbar.org/about> Accessed 30th July 2013

Winn, E. (2008) *Supporting the needs of students with Asperger's syndrome*. Talk delivered at event for International Day of Disabled People, University of Bradford, 3rd December 2008