Holistic approaches to e-learning accessibility

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Holistic Approaches to E-Learning Accessibility

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Abstract
The importance of accessibility to digital e-learning resources is widely acknowledged. The W3C WAI has played a leading role in promoting the importance of accessibility and developing guidelines which can help when developing accessible Web resources. The accessibility of e-learning resources provides additional challenges. In this paper the authors describe a holistic framework for addressing e-learning accessibility which takes into account the usability of e-learning, pedagogic issues and student learning styles in addition to technical and resource issues. The paper goes onto describe issues surrounding staff development issues and evaluation of these resources. The paper is adapted from Implementing A Holistic Approach To E-Learning Accessibility (Kelly, Phipps and Howell, 2005) given at the ALT-Conference in September 2005).

Introduction
The importance of universal accessibility to Web resources is widely acknowledged. W3C's Web Accessibility Initiative (WAI) has developed guidelines which help to ensure that Web resources can be accessed by people with disabilities. With the Web providing the main delivery channel for e-learning resources it would appear that the WAI guidelines should be a requirement for e-learning development. However, this paper puts the case for a wider perspective, recognising limitations of WAI guidelines and implementation and acknowledging that the IT sector has responded to demand for accessible digital resources by providing accessible versions of proprietary formats and operating systems.

The Web Accessibility Initiative
The World Wide Web Consortium (W3C) (the body responsible for the coordination of developments to Web standards) established the Web Accessibility Initiative (WAI) with a remit to lead the Web to its full potential with a particular reference to promoting a high degree of accessibility for people with disabilities. WAI has successfully raised awareness of the importance of Web accessibility and in developing guidelines which help to ensure that Web resources are accessible, with the Web Content Accessibility Guidelines, often referred to as WCAG (WAI, 1999) being of particular relevance to developers of Web resources.

Challenges in Implementing WAI WCAG Guidelines
In 2001 the UK Government introduced the Special Educational Needs and Disability Act (SENDA, 2001), bringing the previously excluded elements of the education sector within the remit of existing anti discrimination legislation. In the same year the JISC

the (Joint Information Systems Committee) established the TechDis service with a remit for all aspects of technology and disability within education. Since 2001 the service has been working with other intermediaries to try and understand the ramifications of the legislation on, amongst other things, e-learning.

An excellent overview of the legislation highlighting many of the issues that would be affected by the legislation is given in (Willder, 2002). However, she concludes that until the legislation is tested it will be difficult to draw conclusions. (Sloan, 2002) suggests that there is little doubt that e-learning will be within the scope of UK legislation:

> "… it can be seen that there is likely to be a duty on higher and further education institutions to ensure that their online teaching resources and VLEs are provided in a form accessible to disabled students. Further, institutions will be expected to make 'reasonable adjustments' to overcome these problems and are unlikely to be able to justify continuing discrimination."

Over a period of 4 years the authors have been working together with academic staff and individuals working in the policy area to better understand how standards and guidelines fit together with UK legislation and how that then transposes onto the learning experience of a disabled student in the UK. In working with learning technologists, disability staff and lecturers, the authors and others acknowledged in this paper have come to some interesting conclusions and challenges to those who are working in the field of accessibility.

Kelly, Phipps and Howell (2005), describe some of the experiences of staff involved in e-learning attempting to map their work onto WCAG guidelines. They conclude that whilst WCAG guidelines have a very important role to play in the creation of more generic web-based materials, it is difficult to relate the same approach to a rich e-learning experience that is accessible to all students. They reflect that the application of guidelines to individual objects can create problems and describe a more holistice approach.

A Holistic Approach

The Need for a Holistic Approach
Much emphasis is now placed on accessibility in education; generally this has come to be synonymous with Web accessibility or the accessibility of e-learning. However to staff who are just starting out in educational development or using technology in a very iterative way with students the application of these standards and guidelines can be at best a discouragement or at worst damaging, preventing staff from exploring the potential of e-learning.

This approach also ignores a major facet of the educational experience: it is holistic. Students attend an institution and partake of a range of facilities and activities – some they will not relate to, others they will. Because a disabled student cannot access one type of assessment that happens to be delivered via a Web browser, it does not mean they cannot instead do an oral examination in a one-to-one situation. The current accessibility paradigm places emphasis on total online access, or if materials cannot be made accessible, then providing an equivalent online experience. This can be damaging to the educational experience of attending an

institution, ignoring the fact that institutions and their staff deploy a range of learning methods, some of which will suit all students; others will not. The only way to judge the accessibility of an institution is to assess it holistically and not judge it by a single method of delivery.

The components of a proposed holistic framework to support the development of e-learning resources are outlined below.

Usability Issues
The Disability Rights Commission's report (DRC 2004) highlighted the importance of Web site usability for people with disabilities. The report pointed out that "45% of [the 585 accessibility and usability] problems were not a violation of any [WAI WCAG] Checkpoint and could therefore have been present on any WAI-conformant site regardless of rating". This point illustrates a limitation of the WAI WCAG guidelines. It should be self-evident that quality e-learning Web resources should be usable and not just accessible. However the strong emphasis given to accessibility, especially with concerns sometimes expressed that failure to comply with W3C WAI WCAG guidelines could lead to legal action, can lead to failure to give equal weight to usability issues.

Although it might appear desirable to include usability alongside accessibility there is a need to be aware of potential conflicts. This may be partly due to poor support for Web standards in browsers. In addition users may express preferences for e-learning resources which have conflict with accessibility guidelines. The proprietary Flash format is widely used for the development of interactive e-learning resources and on-line games. Such resources may be accessible. The RNIB (Royal National Institute for the Blind), for example, has encouraged the development of accessible Flash resources. The RNIB also provide advice on the development of accessible Flash resources (RNIB, n.d.). Although resources such as the RNIB Blind Date game may be usable and accessible, they would not appear to comply with the WAI WCAG guidelines as they make use of a proprietary file format.

Accessible e-Learning or Accessible Learning?
In the holistic approach to accessible e-learning there is a need to provide accessible **learning** experiences, and not necessarily an accessible **e-learning** experience. This approach has parallels with the concept of *blended learning* rather than the more limited *e-learning* approach.

As an example, consider an e-learning environment which provides a highly interactive 3D visualisation of a molecule. Such an environment is likely to be very difficult to make accessible to a visually impaired student or a student with impaired motor skills. Rather than seeking to develop an accessible version of such an environment (which, if possible to do, may prove costly, without any guarantee that the accessible equivalent will be usable by the student with disabilities). In such a case the teacher should consider the learning experience provided by the e-learning resources and seek to develop an alternative which provides an equivalent learning experience. In many cases it should be possible to find an acceptable equivalent learning experience, such as the resources used prior to the development of the e-learning resource (for example, a physical representation of a molecule).

This approach may also be used when a real-world learning experience is not accessible. For example consider a field course for a geography student, which requires climbing a mountain or other terrain unsuited for a student in a wheelchair or with similar physical disabilities (this may include an overweight student or a heavy smoker who finds physical exertions difficult). A blinkered approach may seek to make the mountain accessible by using expensive all-terrain vehicles, building appropriate paths and ramps at key sites or, in the worst case scenario, cancelling the field trip for all students. A holistic approach allows the teacher to identify the learning experiences (such as the selection of appropriate sites to take water and soil samples) and seek equivalent learning experiences (perhaps providing the student with 3G phone technologies, videos, for use in selecting the sites, followed by discussion of the test results with other team members at base camp). This holistic approach to accessible learning has been accepted in a number of academic disciplines. For example the Virtual Field Course Web site (VFC, n.d.) describes several approaches to support field studies for students with disabilities.

Accessible Courses
This holistic approach encourages a more bird's eye view of the learning experience encountered by disabled students. The learning path that the student chooses to follow should be accessible while individual online components or learning objects may not. To provide another example consider a blind student who wishes to take a degree in biochemistry. When choosing a course the student should be advised on course modules which the student's disability may make it difficult for the student to pass (such as options which may require a student to peer through a microscope and describe what they see). Although such courses may not be possible for a blind student to take, the department could seek to provide accessible alternative course options which would still allow the student to be awarded a degree.

Adapting to Individual, Local, Political and Cultural Factors
The final components of the holistic framework for e-learning accessibility calls for an approach which takes into account individual needs and local cultural, political and social factors. Since accessibility is primarily about people and not about technologies the authors feel it is inappropriate to seek a universal solution. In seeking to provide accessible learning experiences it will be necessary to take into account the individual's specific needs, institutional factors, the subject discipline and the broader cultural and political factors.

Instead of aiming to provide an e-learning resource which is accessible to everyone this paper argues there can be advantages in providing resources which are tailored for the student's particular needs. An example of this approach is given in Section 5 of this paper.

The Holistic Framework
The holistic framework for e-learning accessibility, which has been described elsewhere (Kelly, 2005a) is illustrated in Figure 1.
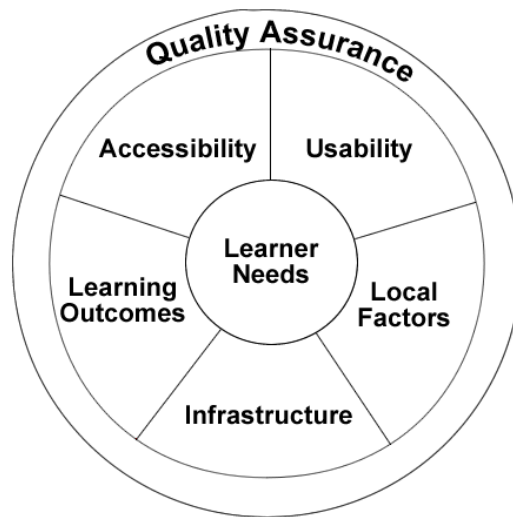
Figure 1: Holistic Framework for E-Learning Accessibility

Rather than relying purely on the WAI guidelines, the framework incorporates the guidelines as part of a broader approach to the provision of accessible e-learning resources. There is a need to address the usability of e-learning resources, the pedagogic aims of the e-learning resources, infrastructural and resources issues and to provide solutions which are appropriate to the needs of the framework. The authors feel that a quality assurance framework is needed to support this approach which will ensure that documented policies are provided and systematic procedures for ensuring compliance with the policies are implemented.

Discussion

It could be argued that this approach has limitations compared with the W3C WAI guidelines. The WAI guidelines can appear easier to implement as they provides a series of checklists. However a checklist approach can, in fact, be counter-productive as it encourages developers to prioritise the objective areas which testing tools can easily report on.

Another limitation of this approach may be its lack of universality which is implicit in its inclusion of institutional and local factors. This criticism may, in fact, be regarded in some quarters as strength of the approach, as it does not seek to mandate a single global solution, but rather welcomes diversity and a learner-centric approach to e-learning.

Whilst this work has been discussed and revised at length at various workshops and conferences, there is still a need to develop the framework and to provide examples of how it could be applied in a variety of circumstances, including differing learning environments, students with a variety of disabilities, use of various technologies and in a variety of different organisations.

The Need for a Holistic Approach

An article (Sitemorse, 2005) published by the accessibility auditing software company Sitemorse has generated heated debate over the relative merits of automated accessibility checking versus manual testing. The article describes the findings of an automated analysis carried out by Sitemorse across the Web sites of various disability organisations within the UK including the RNIB, RNID, the Disability Rights Commission, etc. The arguments over the relevance of the findings clearly

demonstrates a lack of consensus and illustrates the difficulties that even national disability organisations find in complying with even basic WAI WCAG guidelines.

However the article failed to provide a solution to these conflicts. In this paper a framework has been described which does provide a resolution to this impasse. The framework is applicable to a learning context but is also well-suited to the provision of informational resources, such as those provided by disability organisations (who are targeting specific audiences) mentioned in the Sitemorse article.

The Holistic Approach in Development Cycle

In trying to provide pragmatic guidance what emerged was a suggested framework for developers that could be applied at various points in an e-learning development cycle. What is demonstrated below is the result of discussions with colleagues in both the disability and e-learning areas of education. It is also 'work in progress'; we are not seeking to claim that this is the final answer, but hope that it does help contribute to the discussion. The final caveat is that this is designed to be applicable to UK education institutions; we are not trying to create a model that will fit all areas of e-learning.

In using the framework below it is suggested that developers document in some way the process as they work through it. This will be useful if challenged, but also as a means of reflecting on the process when undertaking further developments.

Stage One	Stage Two	Stage Three	Stage Four	Stage Five
Awareness	Investigation	Understanding	Implementation	Evaluation
Understanding of resources under development in relation to inclusion	Identification of existing established practices	Assessment of applicability	Identification of Alternative, Intervention or Adjustment	Can the student meet the learning outcomes? Evaluation at the macro scale

Stage One - Awareness

Here the developer is asked to consider specific issues relating to the development of e-learning material and consider the needs of disabled students. For example, it is suggested that, if an online assessment is being created, the developer should be aware that there are issues related to how someone with a vision impairment would access it.

Stage Two - Investigation

Here the developer, after becoming aware that there may be some issues with the resource, investigates what existing guidelines, 'standards' or practices are available that would support the resource under development in relation to inclusion. For example, it may be that the use of W3C guidelines are applicable in the creation of some content.

Stage Three - Understanding

This is where the developer must make a value judgement: are the practices they have identified in stage 2 valid for the resource under development? Furthermore, they must ensure that the application of the guidelines, 'standards' or practices does not compromise the learning objective or outcome. For example, in an online assessment using images, an alt tag (describing the image) must not give away the answer.

Stage Four - Implementation

This is probably the most important stage to document, after working through the processes and either developing a resource that is 'accessible', or one that may be inaccessible to some audiences it may be necessary to identify other ways of achieving the learning objective. For example, a totally inaccessible online assessment, due to the material or system constraints, may be overcome by holding a viva voce for the student, or an inaccessible discussion group may result in a small group discussion with other students. Documenting these areas is important to ensure that the developer recognised the issues and began the process of identifying alternatives or adjustments.

Stage Five – Evaluation

Evaluation of practice is key in ensuring that the needs of disabled students are met in learning environments. Here it is suggested that not only individual learning outcomes are evaluated, but a wider approach is taken. For example, where a project is funded to provide individual learning objects, it should be evaluated on the whole and not on each product.

Conclusions

This paper argues that although the W3C WAI guidelines for content accessibility are valuable, they should not be regarded as the only set of criteria which developers of e-learning resources need to consider. Not only is there a need to address a wider set of issues than those addressed in the WAI guidelines, there are also other factors which need to be addressed, some of which may conflict with WAI guidelines. In addition there is a need to place the learner at the centre of development process. This approach focuses on the broad learning outcomes and recognises that inaccessible e-learning resources may be deployed provided that disabled learners are still able to demonstrate the required learning outcomes in a way that does not disadvantage them or their non-disabled peers.

The authors acknowledge that, in some quarters, these ideas made be regarded as controversial, especially in organisations which have defined e-learning accessibility policies solely using the WAI guidelines. It is also recognised that there is still an on-going debate to be held. The authors welcome comments and input to this debate.

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