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E-learning and accessibility: An exploration of the potential role of generic pedagogical tools

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ABSTRACT

This paper reviews a range of accessibility tools and evaluates how successful they have been in helping teachers in higher education and further education develop accessible e-learning materials and activities for disabled learners. It is argued that these accessibility specific tools have had limited success to date, and that there may therefore be value in exploring the potential role that more general pedagogic tools might play in the development of accessible e-learning and accessibility practices. Two examples of general pedagogic tools, learning theories and learning design tools, are assessed for the extent to which they raise awareness of an association between accessibility and pedagogy; highlight potential barriers to and facilitators of accessible e-learning and offer methods and approaches for developing accessible e-learning. This assessment suggests that the general pedagogical tools will have a limited or abstract influence on the development of accessible e-learning, but that this influence could be potentially increased by "blending" the use of specific accessibility tools with the use of more general pedagogical tools. The success of a blended approach to designing and developing accessible e-learning will depend on a number of factors, including teacher and learner agency. Nevertheless such an approach could be significant in terms of seeking to make accessibility as much a pedagogical issue as it is a technical one.

1. Introduction

Broadly speaking, accessibility in relation to e-learning (e.g. virtual learning environments, digital repositories, multimedia, web portals and discussion boards) is understood as ensuring that learners are not prevented from accessing technologies or the content and experience offered by technologies on the grounds of their disability. There have been many generic definitions of accessibility that have focused on reducing barriers to accessing the Web and ensuring equitable access for all users (e.g. Paciello, 2000; Web Accessibility Initiative, 2005) The IMS Global Learning Consortium offers a more education specific definition of both disability and accessibility:

> *[..] the term disability has been re-defined as a mismatch between the needs of the learner and the education offered. It is therefore not a personal trait but an artifact of the relationship between the learner and the learning environment or education delivery. Accessibility, given this re-definition, is the ability of the learning environment to adjust to the needs of all learners. Accessibility is determined by the flexibility of the education environment (with respect to presentation, control methods, access modality, and learner supports) and the availability of adequate alternative-but-equivalent content and activities. The needs and preferences of a user may arise from the context or environment the user is in, the tools available (e.g., mobile devices, assistive technologies such as Braille devices, voice recognition systems, or alternative keyboards, etc.), their background, or a disability in the traditional sense. Accessible systems adjust the user interface of the learning environment, locate needed resources and adjust the properties of the resources to match the needs and preferences of the user* (IMS Global Learning Consortium, 2004).

Central to this definition are the concepts of adaptation and flexibility and the idea that learning environments can and should be adjusted to meet the needs of learners. An example of an e-learning resource that has been designed to be accessible and therefore reflects these principles of adaptation and flexibility is the LEXDIS (disabled learners experiences of e-learning) online database [1]. This online resource was designed by researchers and disabled students, for teachers and disabled students. The resource aims to provide information and advice on how disabled students can use technologies effectively to support their learning and on how teachers can support learners in

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this endeavour. There is flexibility in control methods and access modalities in that users can access the information contained within the site using standard access methods such as the mouse or non-standard methods such as screen readers. There is flexibility in learner supports in that in addition to designing the site to work with industry standard access devices, browsers or applications, advice is given to users on how they can access the content using alternative access devices or freely downloadable applications. Finally, content is provided in a variety of formats, so that alternatives to commonly used but sometimes inaccessible files are offered for those who cannot access them. For example, screen reader users frequently struggle to access pdf files and benefit from being able to access alternative word or html based text.

Despite the detail and clarity of the IMS Global Learning Consortium definition and the clear rejection of a deficit approach (medical model) to responding to disabled learners; it is relatively silent on the role that teachers play in ensuring accessibility. Instead of talking about how teachers can adjust online learning environments, it talks instead of accessible systems adjusting the "user interface of the learning environment". This is significant given that disability discrimination legislation in many parts of the world now means that teachers in further and higher education institutions are obliged by law to ensure that e-learning technologies and content are accessible (Her Majesty's Stationary Office, 2001; United States Department of Labour, 1973). This legal imperative means that many teachers within further and higher education Institutions are aware that they should make e-learning accessible. However, as Seale (2006a) argues, despite this awareness, very few know exactly ***how*** to make e-learning accessible. In the light of this lack of awareness, in this paper we will discuss possible ways in which teachers might be supported to develop and deliver accessible e-learning content and experiences.

Discussion about ways in which teachers might be supported will be underpinned by our theoretical position which considers that teachers can be helped to understand how to make e-learning accessible through the use of appropriate and meaningful tools. In other words, the development of accessible e-learning in further and higher education is a practice or activity that can and will be mediated by tools, where tools are understood as any physical or conceptual tool that teachers may use to help them develop and implement accessible e-learning. This theoretical position has been developed by Seale (2004, 2006a, 2007) and draws heavily upon communities of practice (Wenger, 1998) and activity theory (Engestrom, 1987). Both theories prompt us to think about how tools mediate the practice of developing and implementing accessible e-learning materials and activities for disabled students and how the subjects of an activity system or members of a community (e.g. lecturers and developers) respond to and use the tools available to them. In this paper we will argue that:

- Many accessibility specific tools exist, but they do not seem to be having much impact on teachers and teaching practice in further and higher education. This is evidenced by the fact that the accessibility of e-learning in colleges and universities is still very variable. This suggests that a different set of tools may be needed to help teachers develop their accessibility practice further.
- There may be value therefore, in exploring the potential role that generic pedagogical tools might play in the development of accessible e-learning and accessibility practices.

In developing this argument we evaluate the potential contribution that two sets of pedagogical tools: learning theories and learning design tools, might make to helping teachers develop and implement accessible e-learning materials and activities.

2. Accessibility and e-learning: the current tools of practice

Seale (2006a) commented that the lack of knowledge about how to make e-learning accessible was surprising, given the large number of tools that had been developed to supposedly help teachers in this endeavour. The implication being that perhaps the existing tools are not appropriate or fit for purpose. A review of the main accessibility specific tools that are used by teachers at the moment suggests that they fall into two main categories: technical and design tools and conceptual tools. Few of these tools appear to be particularly targeted at those who teach or support learners in further and higher education.

2.1. Technical and design tools

Accessibility related *technical* tools include authoring applications and evaluation and repair applications. Authoring tools that currently exist appear to fall into two categories: multimedia design tools (e.g. Kraithman & Bennett, 2004) and tools that simulate disability (Saito, Fukuda, Takagi, & Asawaka, 2005). Evaluation tools conduct a static analysis of web pages and return a report or rating, whilst repair tools identify problems and recommend improvements (Chisholm & Kasday, 2003).

Accessibility related *design* tools include accessibility guidelines and accessibility standards. The most well known and perhaps influential generic accessibility guidelines are the web content accessibility guidelines (WCAG) developed by the web accessibility initiative (WAI) of the World Wide Web Consortium (W3C), 2008. Other more specific guidelines have been developed, including guidelines for the design and use of virtual learning environments (VLES) in Higher Education (e.g. Pearson & Koppi, 2001). Two prominent accessibility standards that are specific to e-learning and education are the IMS Global Learning Consortium Standards (IMS Global Learning Consortium, 2004) and The Learning Federation Accessibility Specification for Content Development (The Learning Federation, 2007).

Users of both technical and design tools very often require specialist technical knowledge. They tend to work in computing or technology related support services, holding roles such as learning technologists, multimedia developers or web designers. Many people in these roles can find these tools very difficult to use and apply to their own contexts, leading some to suggest a role for specialist experts (Sloan, Rowan, Booth, & Gregor, 2000; Thompson, Burgstahler, & Comden, 2003). Given that practitioners with a technical or technological background can find these tools difficult to use, it is extremely surprising to find examples where teachers (i.e. those with comparatively less technical skills and knowledge) are also encouraged or expected to use these tools (Sams & Yates-Mercer, 2000; Steyaert, 2005).

2.2. Conceptual tools

Accessibility related conceptual tools include metaphors and models. Seale (2006b) identifies three main kinds of accessibility metaphor: equality and playing the field metaphors; divide or gap metaphors and bridge metaphors. Writers use the metaphor of the level play-