Web-Based Higher Education: The Inclusion/Exclusion Paradox

Jan Steyaert

SUMMARY. Increasingly, education is delivered through computers and the internet. This article highlights that while such development is beneficial for some students with functional impairments, it might be excluding others if insufficient attention is paid to accessibility. Both the electronic learning environment (Blackboard, WebCT and the like) as well as the content author need to design for accessibility.

KEYWORDS. Accessibility, e-learning, electronic learning environments

INTRODUCTION

The digital divide is a concept that is irrelevant to most students in higher education. In most countries, higher education implies being in

---

Jan Steyaert, PhD, is Professor of 'Social infrastructure and technology' at the Fontys University of Professional Education in Eindhoven (the Netherlands) and research fellow at the University of Bath, UK.

[Haworth co-indexing entry note]: "Web-Based Higher Education: The Inclusion/Exclusion Paradox." Steyaert, Jan. Co-published simultaneously in *Journal of Technology in Human Services* (The Haworth Press, Inc.) Vol. 23, No. 1/2, 2005, pp. 67-78; and: *Web-Based Education in the Human Services: Models, Methods, and Best Practices* (eds: MacFadden et al.) The Haworth Press, Inc., 2005, pp. 67-78. Single or multiple copies of this article are available for a fee from The Haworth Document Delivery Service [1-800-HAWORTH, 9:00 a.m. - 5:00 p.m. (EST). E-mail address: docdelivery@haworthpress.com].

Available online at http://www.haworthpress.com/web/JTHS

Digital Object Identifier: 10.1300/J017v023n01_05

the lead of the rat race for socio-economic positions. Consequently, higher education students are one of those groups with the highest access to new technology.

There is at least one specific group of higher education students for whom the digital divide is unfortunately very real, and might even be expanding. Students with functional impairments often find higher education environments very disabling. Although the development towards web-based higher education is a great opportunity for these students and can imply a significant gain in inclusion, the reality is often gloomy with web-based higher education failing to transpose the basic accessibility notions from the physical to the digital environment. As a result, the current development towards web-based higher education includes the threat of increased exclusion.

This article will expand on this apparent paradox that the technology that provides a great platform for inclusion, in reality appears to be excluding. A five step analysis and some mythology will describe what this paradox is and how to overcome it.

FROM DISABILITY TO IMPAIRMENTS

The first step in the analysis of the inclusion/exclusion paradox takes us back 25 years when a subtle change occurred in the language used to refer to handicaps. Rather than talk about handicaps, we started talking about impairments. Someone restricted to a wheelchair was no longer a handicapped person, but somebody with a mobility impairment. A blind person became somebody with a vision impairments. Some made it their mission to promote the use of politically correct jargon in this area while others joked we should no longer talk about a Lilliputian or dwarf, but about somebody with a vertical growth impairment.

The words we use are however but a reflection of our thinking. Beneath the war of words, a fundamental transition took place from a medical to a social perspective on disability. Traditionally, much of the health and social policy on disability was based on a *medical model* that viewed disability as a "personal" problem, directly caused by disease, trauma or health conditions, and one which required medical care provided in the form of individual treatment by professionals. The *social model* of disability, on the other hand, sees the issue mainly as a "societal" problem. Disablement is not an attribute of a person, but created by the environment in which persons with impairments live and act.

When I am driving a car and wish to locate a specific station on the car radio, I am temporarily vision impaired (at least, if you want to keep driving and not crash into something) and unable to read all the labels on the radio buttons. When I wish to enjoy a sunny afternoon in the city and take my young (grand) child in its stroller for a walk, I am temporarily mobility impaired and struggling with the high entries to buses. Dyslexia is no big problem, until some professor insists I do a written exam and excludes the option of a verbal assessment.

This change in perspective is well documented in many publications (Oliver, 1990, 1996, 1991). Its formal start date can be pinned down to the publication in 1980 of the World Health Organization's *ICIDH-1980* classification on impairment, disability and handicap. These terms are central constructs to the classification and used in a precisely defined way. An *impairment* is any loss or abnormality of a psychological, physiological or anatomical structure or function. A *disability* is any restriction or lack of ability, resulting from an impairment, to perform an activity in a manner considered normal for people. A *handicap* is a disadvantage, resulting from an impairment or disability, that limits the fulfillment of individual goals.

DESIGN FOR EXCLUSION, OR NOT

The consequences of this change of perspective from a medical to a social model include a shift of management of the situation from the individual to society. Or rather, a supplement, as medical treatment of impairments of course maintains its importance. Disability requires social action and is the collective responsibility of society to make the environmental modifications necessary for the full participation of people with impairments. The way products and services are designed makes them, often by non-decision, exclusive or inclusive (Norman, 1988).

This is most recognized in the domain of the built environment. Fortunately, it has become commonplace to build or renovate every public building so that they include features for people with impairments. Such public buildings encompass theatres, town halls, museums and also, buildings for higher education. To move between levels, stairs are supplemented with elevators and ramps to accommodate not only users of wheelchairs, but also parents pushing prams or people carrying heavy luggage. Another feature increasingly common are induction loops in lecture halls or at ticket services of, e.g., train stations. These induction loops are essentially loops of insulated wire that are placed in rooms

which directly transmit sound to hearing aids. The sound is either taken directly from the radio, television or other medium, or indirectly through a microphone. Their presence is indicated by the universal symbol for hearing impairments with a T-symbol added (see Figure 1). These are just the most obvious examples of how to make a built environment more accessible to people with varying capabilities and impairments. There are numerous guidelines from which architects and city planners and similar professionals can benefit to design for inclusion and several good overviews are available (Preiser & Ostroff, 2001).

An area related to this built environment is public transport. Not only is accessibility a feature of railway and subway stations, also the access to train carriages or bus coaches can be a significant threshold for mobility impaired people. This situation can be addressed by constructing carriages and coaches with floors that level the entry platform at the stations, and by providing areas in the carriages and coaches without seats that but allow for wheelchairs and strollers.

An area very different but no less central to daily life is packaging. As people get older, they lose strength in their hands and have increasing problems with opening jars and packaging. Again, the impairment of weak hand power does not need to become a disability when the packaging is designed in such a way as to require minimal hand power. For instance, bottle caps require significantly less power to open upon first time use when they are not round but eight-square. Why should industry not adopt such an accessibility feature as standard and design for inclusion rather than exclusion? Surely the cost element between producing a round or eight-square cap to bottles is non-existent or minimal.

Design for inclusion does not always relate to tangible products but also includes attitudes and gestures. Hearing impaired people often en-

FIGURE 1. Universal symbol for hearing impairments with a T-symbol added.

counter a disability when people talk to them without facing them, or while covering their mouth with their hand. Try to monitor for a couple of days during your meetings how often this happens, and you'll be surprised. Although a small detail of life, for hearing impaired persons it implies they cannot support their hearing with facial expressions and rudimentary lip reading.

The notion that design of products and services can be exclusive as well as inclusive and should be the latter has been encapsulated in the concepts of "design-for-all" and "universal design." While the latter is more commonplace in North America, the first has been adopted by the European Commission. However, there are no substantial differences between these two concepts, or alternatives like inclusive design or "barrier free design" used by, e.g., OECD (Organization for Economic Co-operation and Development). All these labels refer to designing products and services in such a way that usage is independent of impairments.

NEW MEDIA DESIGNED TO EXCLUDE

What goes for the built environment, public transport and packaging also goes for new media. Products and services can be designed to include or to exclude. Just consider the following situation that occurred some months ago after a long meeting. Because the meeting took more time than scheduled, one of the participants asked if he could use my mobile phone. So I gave him my phone, with the instruction to punch the number and then the green button. Blank stare. Green button ?? This man happened to be colour blind, an impairment not easily observed but neither rare. Although 8% of men are colour blind and can't tell the difference between green and red, that is exactly the colour that the overwhelming majority of mobile phones use to distinguish between the buttons to place or cancel, to accept or disregard a call. Some phones use redundancy of signals, and supplement the colour coding with the words "yes" and "no" as, e.g., on the latest Sony Ericsson phones. This is basically the same principle used in European traffic lights for pedestrians. That is red and green colours, top light is stop and bottom light is walk, supplemented by an icon of a walking or waiting person and sometimes by tinkering sounds. Redundancy of signals is good practice in terms of accessibility and make your message hard to miss.

Although the difference between red and green buttons on a mobile phone may sound trivial because you can easily learn how to use it without having to rely on the colour coding, it becomes more cumbersome if

you use the same colours to offer different menu options in a computer program. Microsoft's Word uses green and red coding to distinguish between spelling and grammar mistakes. And there is the story of Amazon.com that had a button "click here to confirm your order" in a colour that made it indistinguishable to its background for those 8% of male colour blind citizens (Follansbee, 2001).

But accessibility of new media isn't limited to colour blindness. Hardware and software can accommodate for other impairments and be inclusive, or disregard their specific user requirements and be inclusive. Illustrative examples of new media that are or were excluding by design are the mobile phones that were incompatible with hearing aids and thus disabling hearing impaired persons. Another example concerns video recorders (OK, maybe not so "new" media) that do not record the captioning of programmes thus disabling the hearing impaired persons.

Fortunately, not all is gloomy. Recent versions of software have seen a substantial increase in accessibility. For instance, Windows XP now embodies several accessibility features such as coping with the use of the mouse by left and right handed persons, high contrast on the screen, sticky keys that are useful when one is unable to hold down, e.g., shift and another key at the same time. Several other features are also included. Web browsers allow for increased or decreased font size. Other major software providers have included accessibility features in their products (Adobe, 2004; Corel, 2004; Macromedia, 2004; Microsoft, 2004). Unfortunately, many higher education institutes have computer management turning off use of these features to improve efficiency of computer maintenance, but thus excluding students and staff with impairments.

Much gain in accessibility of new media is the result of legislation in the U.S., such as the Telecommunication Act and the Americans with Disability Act, but most specifically to section 508 of the Rehabilitation Act (Wall & Sarver, 2003) (see also http://www.section508.gov). This section requires Federal agencies to make their electronic and information technology accessible to people with impairments and has inspired legislative action at the state level and international. European legislation is slowly mirroring this American legislation and encouraging public authorities to include design for all requirements when awarding public contracts. This is done both through European legislation as well as member states legislation, for instance Germany or Ireland.

Not only can hardware and software producers design for inclusion or exclusion, but content providers become increasingly important in influencing the accessibility of the information society. Fortunately, the

World Wide Web consortium (W3C) is continuously hosting a global "Web Accessibility Initiative" that produces guidelines and information on how to make web sites accessible. The initiative includes a set of basic guidelines such as (1) to always provide an alternative text to a graphics on your web page, (2) do not only include the image of your company logo, but also the alternative text 'logo of company XYZ,' (3) always indicate the language(s) used on the webpage, and similar guidelines. Most of these guidelines also apply to content produced in Word and Acrobat documents. In Word, right-click on an image, select "format picture" and use the tab "Web" to include alternative text. Some of these guidelines are encapsulated in the most common website authoring software, but they are not "enforced" by these authoring environments. Content provider still need to be aware of the accessibility issues involved in designing a web site. One only needs to google for the keywords "accessibility" and the name of the authoring software one uses, such as FrontPage or Dreamweaver, to find out how to design for inclusion. Needless to say, these accessibility features in software environments can be improved upon, but more significant gains in accessibility can be attained by using those features already available. This not only implies the software industry, but also the content authors need to have accessibility in mind while designing their courseware.

WEB-BASED HIGHER EDUCATION DESIGNED TO EXCLUDE

The fourth step in our analysis of the inclusion/exclusion paradox is a logical consequence of the previous step. What goes for generic new media products, also goes for web-based higher education and the specific applications involved in it. Similar to generic software, environments to develop and deliver web-based higher education have incorporated features to facilitate the production of accessible courseware. These include the well-known products Blackboard and WebCT. You can google on the keywords "accessibility" and the name of your favorite working environment to learn more about these features.

Blackboard as well as WebCT include accessibility features by providing alternative texts to all system images and allowing content authors to include alternative text to all imported images. Framesets can be titled and tables are optimized for use by screen readers. The companies also makes manuals available on how to author content for learning environments while meeting accessibility requirements. From version 6

of Blackboard onwards, the virtual classroom has been redesigned to make it more accessible, although the speed of communication in chatrooms will always be problematic for any student with low typing abilities. The timing for assessments needs to be set on an individual basis to allow for extra time for students with functional impairments, where appropriate.

In general, new editions of educational software have increased accessibility features. From that perspective, it is useful to upgrade to new versions whenever these are released. This progress also implies one should be careful with web information on accessibility and this software, and carefully check which version is being discussed. However, upgrading to new versions should not be a replacement for content authors doing their share of work to include accessibility in electronic higher education.

Within web-based higher education, it is necessary to remember that accessibility is not limited to the actual delivery of the course contents, but also relevant to, e.g., information about and registration to, these courses and student assessments. As such, one also needs to include accessibility features in computer-based assessment environments like Question Mark (Wiles, 2002). Also access to digital libraries, such as Ingenta and Sciencedirect, needs to be an issue. Again, since these services are also geared towards American higher education, they are thus subject to the previously mentioned U.S. legislation and do attempt to provide accessible applications.

CONTENT PROVIDERS EXCLUDE

Having accessibility features in web authoring environments for generic purposes or specifically for educational content is only a necessary and not a sufficient condition to making web-based higher education inclusive rather than exclusive.

A March 2004 survey of UK web sites found that 79% of the tested web sites failed basic compliance testing on accessibility. Government sites fared better, but still 40% failed accessibility standards set by UK legislation (Web Accessibility Study 2004). A Dutch accessibility monitor that surveyed web sites during November 2003 to January 2004 found that 95% of them did not meet the first level of accessibility as specified by the Web Accessibility Initiative. More amazing than these high percentages was the observation that all failed to meet accessibility

criteria due to small and easy to correct omissions, such as alternative text to graphics or indication of language used.

Similar older surveys show comparable results. Where these surveys sampled generic web sites, another survey that sampled general, not course delivery, web sites of institutes of higher education in the Netherlands found equally high levels of exclusion. No equivalent surveys for web-based higher education are available. However, there is no reason to assume these higher education web applications are more accessible.

This draws our 5-step analyses of the inclusion/exclusion paradox of web-based higher education to an end. The key conclusion is that but a small change is required to guarantee that web-based higher education proves to be a gain in inclusion rather than a new ground for exclusion for students with impairments. Content providers are the key stakeholders that can tip the balance by the way they use, or not use, the accessibility features provided by authoring environments, ranging from Microsoft Word to Blackboard and Question Mark.

There are some myths around accessibility and web-based content that prevent content providers to implement the relatively easy changes required to make web-based higher education inclusive.

MYTH 1

The most persistent myth states that including accessibility in web sites decreases their attractiveness to users. The fear of many content providers is that following the accessibility guidelines forces them to reduce the use of graphics and design elements. This is a myth because accessibility in no way calls for a reduction of design features. Rather, it calls for allowing as much flexibility as possible to the users so they can change, e.g., colour, font, screen layout, etc., according to their needs. It also calls for the provision of alternative designs for users with impairments such as text supplementing a graphic, captioning supplementing sound in digital video, a text description supplementing a flash animation. It is common though not good practice to invest in a non-graphic, text-only version of a web site. In practice, such text-only web sites are a severely limited edition of the graphic-rich version, and remain non-updated. Furthermore, many of the guidelines on accessibility are similar to guidelines for generic web usability and consequently should be included in the main web site.

Having said this, one also needs to recognize that web sites of several organizations working in the area of impairments have a sober design and thus reinforce this myth of incompatibility between accessibility and attractiveness. I call upon these organizations to upgrade the design level of their web sites while maintaining accessibility to actively debunk this myth.

MYTH 2

A next myth relates to the planning of including accessibility in web design or design of web-based higher education. Many content providers plan their work so that their end product is 80 or 90 percent finished before accessibility features are added. The myth is that one can design inclusion/exclusion neutral and make the necessary changes in the final stages just before the formal launch. Unfortunately, accessibility is not a layer of coat that needs to be applied at the end of a building project, but rather the iron that strengthens the concrete. As everybody knows, that iron needs to be there before the concrete, and cannot be inserted afterwards. Still, with accessibility and web-based content, that is exactly what many try to do, and they find it hard or impossible to accomplish.

MYTH 3

A final myth involves the lack of information. When talking to content providers about accessibility, many recognize the need for inclusive web sites but refer to a lack of detailed information on how to accomplish this. In the era that google replaced the Encyclopedia Britannica as the ultimate source of knowledge, it is hard to envisage somebody maintaining this myth. For those who need more than their favorite search machine, two references should suffice. The Web Accessibility Initiative is the best portal to start finding information about accessibility for generic web applications, while TechDis (UK, see http://www.techdis.ac.uk) and the National Center on Accessible Information Technology in Education (USA, see http://www.washington.edu/accessit) are good places for information on higher education applications.

CONCLUSION: WHAT TO DO

Finally, and by way of conclusion, here's a limited shortlist of what any person or institute involved with higher education should do to con-

tribute to tipping the balance towards an inclusive web-based higher education.

The first step is to include accessibility features in all computerized higher education content. If such content is produced in-house, this can be achieved by ensuring that all authoring software comes with updated accessibility modules which can almost always be downloaded for free from the provider's web site. The next task is ensuring that content producers are aware of why and how to make use of these modules. In the case that content is produced in a home-made virtual learning environment, the institute can consider enforcing accessibility guidelines, such as, not accepting a graphic without a meaningful alternative text. If the web publication of content is purchased rather than home-made, accessibility needs to be included in the purchasing requirements. Many providers will reply by referring to the myths mentioned above, but fortunately an increasing number of web designers are aware of the importance of inclusive web design and the similarity between accessibility guidelines and those for web usability.

Second, once accessible web-based higher education is available or in the making, one should validate and monitor. The basic attitude behind validation should not be to sanction, but to detect areas of improvement. For validation, one can rely on freely available validation applications such as Bobby (see http://bobby.watchfire.com) or Vischeck (for colour blindness, see www.vischeck.com) or TABLIN (for tables, see www.w3. org/WAI/Resources/Tablin). However, such validation services can never fully be relied upon and can result in inappropriate trust in having provided accessible web sites (Witt & McDermott, 2004). For instance, they check for the presence of alternative text to graphics, but do not assess whether such alternative text is meaningful. One could fool all validation services by including "a picture" as alternative text to all graphics, but still have an inaccessible web site. Higher education organizations should supplement such validation by validation made by students or staff with impairments. Once certain levels of accessibility are achieved, one can also communicate this by including an accessibility label on the homepage.

REFERENCES

Adobe. (2004). *Adobe accessibility*. Retrieved 22nd May 2004, from the World Wide Web: http://access.adobe.com/.

Blackboard. (2004). *Blackboard accessibility*. Retrieved 22nd May 2004, from the World Wide Web: www.blackboard.com/products/access.

Corel. (2004). *Corel accessibility*. Retrieved 22nd May 2004, from the World Wide Web: www.corel.com/accessibility.

Follansbee, T. (2001). Colorblindness and usability. *WebWord*, http://www.WebWord.com/moving/colorblindness.html.

Macromedia. (2004). *Macromedia accessibility*. Retrieved 22nd May 2004, from the World Wide Web: www.macromedia.com/macromedia/accessibility/.

Microsoft. (2004). *Microsoft accessibility*. Retrieved 22nd May 2004, from the World Wide Web: www.microsoft.com/enable.

Norman, D. (1988). *The design of everyday things*. London: MIT Press.

Oliver, M. (1990). *The politics of disablement*. London: MacMillan.

Oliver, M. (1996). *Understanding disability, from theory to practice*. London: Macmillan.

Oliver, M. (Ed.). (1991). *Social work, disabled people and disabling environments* (English ed.). London: Jessica Kingsley.

Preiser, W., & Ostroff, E. (Eds.). (2001). *Universal design handbook*. New York: McGraw Hill.

Wall, P., & Sarver, L. (2003). Disabled student access in an era of technology. *The internet and higher education, 6*, 277-284.

WebCT. (2004). *WebCT accessibility*. Retrieved 22nd May 2004, from the World Wide Web: http://www.webct.com/products/viewpage?name=products_accessibility.

Wiles, K. (2002). Accessibility and computer-based assessment: A whole new set of issues? In L. Phipps & A. Sutherland & J. Seale (Eds.), *Access all areas: Disability, technology and learning* (pp. 61-65 and available from www.techdis.ac.uk). Bristol: Joint Information Systems Committee.

Witt, N., & McDermott, A. (2004). Web site accessibility: What logo will we use today? *British Journal of Educational Technology, 35*(1), 45-56.