The Implementation of Web Accessibility Standards for Learning Content Management Systems in International Schools

Abstract
The development of information and communication technologies have improved the dissemination of information and knowledge globally. It is difficult to imagine a university, college, school, or scientific institution without access to the Internet and modern communications technology. Modern technologies have proven to be an engine for development, and at the same time, obstacles for people with disabilities. Standards for web accessibility are a necessary precondition for school information systems which aid students, teachers and parents in understanding and building relationships with each other and with school activities.

Introduction
In the mid-nineties, people with disabilities filed complaints in both the U.S. and Spain to challenge a lack of accessibility provisions that municipal governments were providing for their online documents. These people were unable to access information or learn about education opportunities, cultural events, or ways to participate and contribute to their communities. In the following years a number of technology, law, education, and policy experts have developed accessibility standards to address such problems. One body of experts, the World Wide Web Consortium, developed guidelines and recommendations for web designers to encourage them to build websites that were fully accessible for people with disabilities. Many countries adopted those standards in their legal systems.

In support of these new accessibility standards, Article 9 and Article 21 of the UN Convention on Rights of Persons with Disabilities [1] stress importance of accessibility of Internet resources. Article 21 of the UN Convention on Rights of Persons with Disabilities states the following:

States Parties shall take all appropriate measures to ensure that persons with disabilities can exercise the right to freedom of expression and opinion, including the freedom to seek, receive and impart information and ideas on an equal basis with others and through all forms of communication of their choice, as defined in article 21 of the present Convention, including by:
a) Providing information intended for the general public to persons with disabilities in accessible formats and technologies appropriate to different kinds of disabilities in a timely manner and without additional cost;
b) Accepting and facilitating the use of sign languages, Braille, augmentative and alternative communication, and all other accessible means, modes and formats of communication of their choice by persons with disabilities in official interactions;
d) Encouraging the mass media, including providers of information through the Internet, to make their services accessible to persons with disabilities;

Abridged - points C and E not included here.

The rights outlined in this convention issue a challenge to international schools: accessibility standards for digital content should not be an extra or optional feature. The widespread adoption of accessibility standards by international schools would demonstrate the willingness of these schools to communicate openly with all of their teachers, students, and parents, as well as their broader communities.

The Importance of Universal Access
The implementation of information technology in educational settings is no longer an option for the intrepid few. Instead these technologies and compliance with accompanying standards have become obligatory. [2] Not only must these technologies meet the needs of people with disabilities, but they must also be flexible enough to adapt to the kinds of social, cultural, and situational circumstances that require adaptive functionality. Examples of frequently-used technology that must be accessible to all are e-mail, static documents, on-line resources, educational repositories, learning content management systems (LCMS), and school administration systems. If schools are to communicate publicly and reach the widest possible audience, they must adopt universal means of communication.

Now that so many people have access to the Internet and its use is so common, most communication tools now involve it in some way. These tools can include scientific and educational blogs, web-based applications for educational purposes, and various portals, topic-based RSS aggregators, and open access resources. They can be used in a great variety of environments and settings and the following characteristics make web interfaces particularly adaptable:
a) users may find static content next to dynamic content and use both to perform complex operations and activities;
b) web interfaces are functional and efficient in off-line environments such as on standalone workstations, networked low-power thin-clients in rural networks, Intranets, and virtual private networks;
c) web interfaces do not require the presence of expensive hardware servers, switches, hubs, or routers in order to be fully operational;
d) without additional costs, web interfaces can be accessible to people with disabilities in both offline and online educational settings;
e) free software can provide all necessary infrastructure for the efficient operation in off-line environments;
f) web interfaces may be used by a variety of devices that can connect to the Internet including, among others, PDAs, assistive and adaptive technology devices, cellular phones, TCP/IP based sound equipment, TCP/IP based light equipment and other TCP/IP based multimedia.

All of these characteristics of web interfaces are very important when implementing web-based LCMS's and other software for operational management software, mailing lists, portals, school administration tools, and collaborative technologies in international school settings. These characteristics are especially important when web-based learning systems are used in regions where telecommunication infrastructure is rather weak or where access to the Internet is difficult or non-existent.

Accessibility, adaptability and interoperability criteria

The principle of accessibility is often understood as a set of guidelines and standards that overcome the physical and technological barriers that make the internet difficult to use for people who have disabilities. Although this understanding is in many cases true, we can distinguish the following types of accessibility:
a) situational accessibility
b) social - cultural accessibility
c) functional accessibility

Situational accessibility criteria require that people in any "situation" should be able to access the content in question. Therefore, web content should be accessible by cell phones, PDAs, and other remote devices – all tools that allow people to access the Internet when they are not at their personal computers. In our context, this kind of accessibility means students and teachers on field trips or at camps should be able to use a web interface to access and send both educational content and other information.

Social-cultural accessibility criteria require that the school's web site or other web content can be translated into other languages (i.e. local language(s) if the school teaches in a language different from that spoken in its locale). This type of accessibility is especially important for allowing the school to communicate with the community in which it is operating. That said, translated interfaces and manuals are also very helpful for students who do not speak English language well and who would benefit from the additional language support.

An important consideration for social-cultural accessibility is that a site and its contents do not impose an aesthetic outlook and cultural constraints that prevent users from using the site efficiently. This criteria also requires that whenever possible, users should be able to select site designs (with standard content) according to personal choice. As one blatant example, designs based on military themes may be very appealing to people from one culture but abhorrent to those from another – military imagery should not be used. The more options people have to choose their own themes and usability settings, the better.

Functionality accessibility criteria require that online content be accessible for both older users and people with disabilities. These criteria are especially important to the students, teachers, parents, and local community members who are either aging or living with disabilities. Legal regulations in many countries define the technical requirements needed to meet these criteria. International schools should abide by those rules even if the country in which international school is located does not have legal regulations regarding web accessibility.

Detailed functionality accessibility criteria are defined by the standards such as:
a) **W3C WCAG 1.0, W3C WCAG 2.0** (Web Content Accessibility Guidelines)
b) **W3C ATAG 1.0** (Authoring Tools Accessibility Guidelines)
c) **AccessforAll** (framework designed to define and describe resource accessibility)

d) **Section 508**, **Italy Stanca Act** (the name of this act derives from name of the Minister for Innovation and Technology of Italy who introduced it)

e) **ISO FDIS 24751** (Standards for individualised adaptability and accessibility in e-learning, education and training to meet the needs of learners with disabilities and people working alongside them)

f) **ISO 9216** (An international standard for the evaluation of software quality that should apply when school purchase, install other or develop its own software packages)

g) **ISO 9241** (Part 11 defines ergonomic requirements for office work with visual display terminals while other parts define ergonomic requirements for the use of keyboards, non-keybaords input devices, etc.)

Professionals responsible for the operation of information systems in international schools should learn about these standards and then implement them locally. The developers of free software systems such as ATutor, Moodle, Joomla, phpWebSite, and others, have already done so. In general, accreditation organizations should request compliance for the above standards and others. Doing so indicates to educational and local communities that the school is taking accessibility seriously.

Interoperability standards requires that web content, courses, and course parts (including tests and questions) may be easily shared, distributed and used among a variety of systems. For example, IMS and SCORM (Sharable Content Object Reference Model) [4] allows users to export course content from the web-based LCMS and open it in his/her browser even though the originating LCMS is not installed on the user's personal computer. The IMS Question Test Interoperability standard requires that a test created in one LCMS can be easily transferred to and used in other LCMS. This functionality is especially important when teachers create repositories of courses or use existing repositories with content originating from a wide variety of LCMS's.

Our experience

We use ATutor for our learning content creation, distribution and management. ATutor is Web-based LCMS designed in compliance with above mentioned accessibility and interoperability standards. Administrators can install or update ATutor in minutes, develop custom themes to give ATutor a new look, and easily extend its functionality with additional feature modules. Educators can quickly assemble, package, and redistribute web-based instructional content, easily import prepackaged content, and conduct their courses online. ATutor is equally functional on standalone computers, local area networks, and publicly-available Internet servers. The accessibility features of ATutor have increased the system's usability and its simplicity is welcomed by both teachers and students. Students may indicate requirements or preferences for alternative formats (ie. audio, video, text, images) in their user preferences. During the pilot stage we trained several teachers who easily mastered the system and used it to prepare their classes. ATutor's extensive manual is written in both English and Serbian (with more translations to come) so that people can easily learn the system wherever they are. Since ATutor allowed language localization, it is easy for students with different language backgrounds to learn and use the system efficiently.

However, we realized that majority of educational documents on the Internet are not accessible and that additional work is needed to make them so. We were particularly interested in web software that we could use for school administration (daybooks, gradebooks, assessments, report cards, discipline records, schedule, attendance, etc.) and we were looking for something that would be easy to use, reliable, and which would cover our requirements for both functionality and accessibility. We decided to use the free software OpenAdmin developed by Les Richardson, a long time teacher and software developer from Canada. OpenAdmin is designed especially for school administration and it pairs perfectly with ATutor. In terms of meeting our accessibility standards, it does so well and even has a component dedicated to evaluating the progress of students with disabilities. Teachers can set objectives, enter and edit evaluations, and provide assessments specific to the student's disability. Hence, ATutor and OpenAdmin are meeting the requirements of our international school. Due to the software developers from both projects being so willing to cooperate together and with us, we have had a very positive experience with modifying software to meet our needs. No longer are accessibility and adaptability in the domain of the "optional" and "expensive" – we made them a requirement and we met our own requirements affordably.

References:
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4. **Advanced Distributed Learning**, 2009, Documentation Suite (retrieved on June 27 2009, from http://www.adlnet.gov/Technologies/scorm/SCORMSDocuments/2004 4th Edition/Downloads/ SCORM_2004_4ED_DOCs_20090407.zip)

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