

# ACCESSIBILITY CONSIDERATIONS IN CDIO

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## ABSTRACT

This paper delves into the sixth CDIO standard, Engineering Workspaces, to make accessible to all students, virtual workspaces. The paper describes the way to use the accessible Moodle learning platform, which has been adapted by the authors, following the specification IMS Global Access for All v3.0. It takes into consideration the preferences and needs of the student and accessibility metadata of the learning objects.

## KEYWORDS

Accessibility, Engineering Education, E-learning, Standard: 6

## INTRODUCCIÓN

Many definitions of disability have been provided (Altman, 2001). To the layperson, mentions Mitra in 2006, the meaning of disability is “the inability to do something”. Currently has appeared the term functional diversity, which, in opinion of the authors, provides a better description of the reality. The low number of students with functional diversity in the University, especially in technical degrees such as engineering, reveals that this sector of the population is currently marginalized, without access to this type of education. The reason lies in the technical material which are not only text, but composed for diagram, videos, technical devices, etc., and the difficulty to present them to people with functional diversity, such as deaf or blind persons.

## RELATED WORKS AND MOTIVATION

The standard ISO/IEC 24751-1-2-3:2008 “Individualized adaptability and accessibility in e-learning, education and training” (ISO/IEC 24751-1-2-3, 2008), describes the necessary process for adapting e-learning platforms, so that people with functional diversity are able to access the information. The standard refers not only people with functional diversity, but deficient environments, like for example a poor lighting or noisy room. Two data models, one for the Digital Resource Description (DRD), and other for Personal Needs and Preferences (PNP) have been defined for this objective. The complexity of them makes difficult his implementation, (EU4ALL project, 2008-2011). Due to these problems, IMS Global Consortium presented in 2012 the specification IMS Global Access For All (AFA) v3.0 (IMS Access for All, 2012). This specification defines two new data models for PNPs and DRDs that reduces the models presented by the standard, making easier its application.

Multiple learning benefits are provided by educational virtual workspaces like for example creation of synergy, development of critical thinking, promotion of communication, cooperation and individual and group responsibility, increase of motivation and self-esteem, etc. In addition, virtual environments incorporate an important accessible feature since they

provide access to the information regardless of time and distance. Furthermore, unlike face-to-face education environments, are able to provide a greater accessibility by adapting the e-learning platform through software applications. The sixth CDIO standard (CDIO Standards 2.0, 2004) emphasizes the student-centered and accessibility of learning workspaces. The adapted learning platforms meet both requirements since they take into consideration the PNP of the student and follow the official standards, which have been established for e-learning accessibility.

Currently accessibility is being driven for Organizations and Governments. Every country are adapting their law, in order to official Institutions, such as public Universities, make information accessible.

## DEVELOPMENT

The Moodle learning platform has been adapted by the authors through a plug-in software. In this section we describe the process to follow for its utilization. The plug-in has been successfully tested by students with functional diversity. To use the adapted Moodle platform, the content author or teacher must upload into the platform the digital resources with their accessibility metadata, which have been defined by the standards. Besides, the content author must upload the adapted digital resources, which are associated to the original resource. By way of example, a digital resource can be a video tutorial, which can have sign language and audio-description as adapted digital resources. Figure 1 shows both an adapted Learning Object (LO) consisting in sign language for a video tutorial about the use of the oscilloscope.

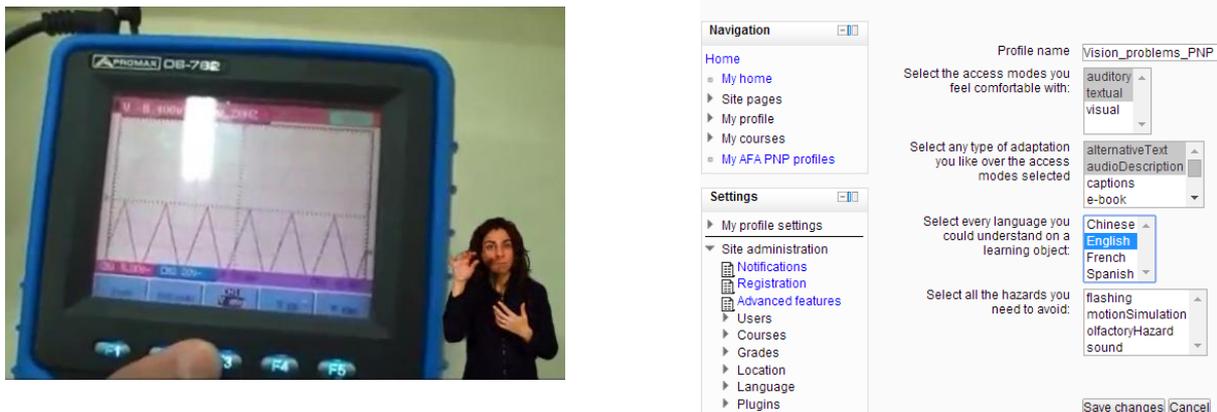


Figure 1. Adapted LO and PNPs for vision problems

Once the course is created, an AFA profile will be created by the student at the moment to register in the platform, through filling out a formulary about his PNPs (showed in figure 1). When the student selects a resource on the platform, a search process is generated in order to find, between the adapted LOs belonging to the selected LO, those that meet the student PNPs. The adapted LOs found will be showed in the screen.

The software architecture of the system consists on a Moodle server, which supports presentation and logical layers, and a MySQL data base, which supports the data layer. Both, the LOs and their metadata, and the student PNPs, are saved in the data base in order to be able for exportation to other systems, such as a LOs repository. The accessibility metadata

files are saved independently of the resource, in XML format. Figure 2 shows the interaction process with both the student and teacher.

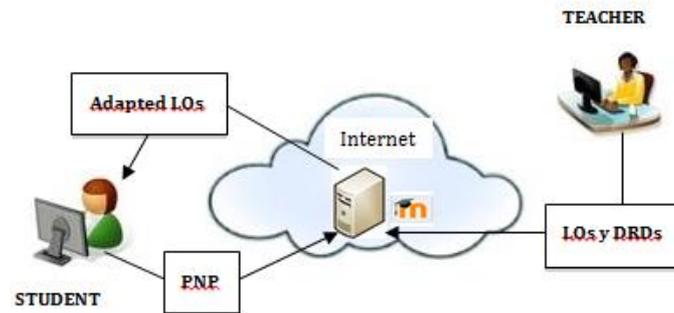


Figure 2. General scheme of the system

## CONCLUSIONS

Adaptation of e-learning platforms is necessary for those persons with functional diversity. Moreover it is especially useful for engineering students due to the variety of formats of the resources used in this area.

The accessibility metadata established by the standards, the students PNP and the interoperability between sub-systems, take special importance in the process.

The application is useful to help the Universities to follow the law established in every country regarding to accessibility.

CDIO project by using adapted learning platform, must take part in the process of making accessible the learning workspace, as said in sixth CDIO standard - Engineering Workspace.

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