Access to cognitive resources without barriers

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Abstract

In today's society, which is characterized by the pervasiveness of information, it is essential to encourage everyone to develop active competences to access the resources that are available on the Web. The active access is intended on the one hand to develop the creative, metacognitive and critical thinking skills that are necessary to manage the lifelong learning process actively, and on the other hand to implement opportunities to participate effectively in democratic life, which is essential to build a profile of active and responsible citizenship with regards to the various contexts of real and digital life. From this point of view, the access to Information and Communication Technology (ICT) assumes a key role for every user, including the ones with disability problems. Through digital technologies people with any disability can improve their chances to have access to products, services and environments that may represent real opportunities to develop their life plan and, therefore, they become enabling opportunities. Consequently, this makes it even more evident that e-learning is a strategic resource to try to fill the distances represented by obstacles set by the traditional educational and informational methods. The products, services and learning paths that are characterized by Web access must be designed in order to be able to be used and managed in an open and inclusive way, taking into consideration all the different special needs of every single person. This design must go beyond the technological standards identified so far, in order to include the pedagogical and methodological aspects necessary to develop a range of courses aiming at providing everyone with opportunities for a "barrier-free" access to the available resources.

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1. The way to an accessible web space

Since its appearance, the World Wide Web, www, as defined by its founder, Tim Berners Lee, has declared its inclusive intent:

> The Web is designed, in turn, to be universal: to include anything and anyone. This universality includes an independence of hardware device and operating system, as I mentioned, and clearly this includes the mobile platform. It also has to allow links between data from any form of life, academic, commercial, private or government. It can't censor: it must allow scribbled ideas and learned journals, and leave it to others to distinguish these. It has to be independent of language and of culture. It has to provide as good an access as it can for people with disabilities. (Berners Lee, 2007)

Information and Communication Technologies and, in particular, Web 2.0 represent an important opportunity to establish forms of inclusion and social justice in the access to cognitive resources and, therefore, in the development of lifelong learning and education paths. These conditions are essential to activate real forms of social engagement.

In order to provide a proactive response to the actual implementation of the inclusion principles, the European Community has initiated since 2000 a whole series of measures intended to focus on the necessity to make the ICT opportunities completely available for people with disabilities, overcoming the obstacles that impede the full use of online services and contents. In other words, the purpose is to create contents that may be easy to access for any user, including people with sensory, motor or mental disabilities (Commission of the European Communities, 2000, 2001).

Asserting that "'accessibility' is defined as meaning that people with disabilities have access, on an equal basis with others, to … information and communications technologies and systems (ICT), and other facilities and services", the European Community (2010) sets that "accessibility is a precondition for participation in society and in the economy, but the EU still has a long way to go in achieving this" and suggests the use of legislative

and other instruments, such as standardisation, to optimize the accessibility to any kind of material and digital structure, including the access to the environments realised through the technological infrastructure.

The question about web sites accessibility arose in 1994, with the foundation of the World Wide Web Consortium, W3C, a non-governmental international organisation chaired by Tim Berners Lee. The aim of the organisation is to develop all the potentialities of the World Wide Web, especially by setting technical standards for the access to devices, web pages, web sites and contents.

In 1997, W3C suggested the Web Accessibility Initiative (WAI), whose following updates are published in the Web Content Accessibility Guidelines (WCAG), aimed at making web contents accessible to people with disabilities, which have quickly established themselves as universal standards.

The contents created according to these parameters are accessible to persons with different kinds of disabilities: blindness, low vision, deafness and hearing loss, learning disabilities, cognitive limitations, limited movements, speech disabilities, photosensitivity and combinations of these (Web Content Accessibility Guidelines, 2009).

However, the WAI model is not always adequate and it is the core of a critical debate about the fact that it is too much focussed on the technological aspect and it does not take enough into consideration the holistic dimension of the user's needs (Kelly B., Sloan D., 2007).

Some studies and in-depth analyses highlight the necessity to integrate the WAI guidelines with other standards, parameters and recommendations in order to build a model which considers the users' needs as well as all the aspects related to the pedagogical issues, the available resources, the culture of organization and the usability. "Un framework composto da più linee guida consentirebbe di avere a disposizione un modello in grado di rispondere a problemi reali con differenti soluzioni, flessibile e dinamico

grazie alla sua estensibilità e alla possibilità di integrare nuove componenti[1]" (Guglielman, 2010).

Therefore, we need a new point of view able to start from the different users' needs and build contexts that are accessible and usable, but also captivating and engaging for all the students.

This inclusive dimension must lead the design process from the earliest phases and include integration and cooperation in the technological, pedagogical and educational aspects, focusing on the students, their needs and their potentialities.

Furthermore, the focus of this dimension should not be technology and its compensatory and assistive potentialities – that is "How can we use cutting-edge technology in designing multimedia presentations?" – but the person, his needs and his potentialities, which must be at the centre of the design process. In other words, the design process should wonder about "How people learn" and try to adapt technology, bending it to the users' needs, in order to improve the informational and educational process (Mayer, 2001).

2. The design of the access to digital learning environment

Accessing information and education through the Web, e-learning or online learning represents therefore a considerable opportunity to facilitate a more extensive, open and democratic use of the educational resources, reducing the social gap sometimes ascribable to face-to-face teaching.

E-learning can be perceived and represented as a social inclusion factor, as explained in the programmatic document of the European Commission (2004), which points out the social value of technology as regards the

1 A framework composed of different guidelines would provide a model which is able to respond to real problems with different solutions and which is flexible and dynamic thanks to its possibility to expand and include new component parts (translated by the author).

reduction of the digital gap and the building of social community and cohesion through the simplification of the access procedures, the construction of captivating and motivating digital environments in which it is possible to carry out collaborative and inclusive activities addressed to any person and to any diversity.

First of all, it is necessary to consider an accurate technological accessibility based on the compliance with the standards and guidelines provided by the Global Learning Consortium (IMS). These include, among other merely technical ones:

- The customization of the environment through the opportunity for the user to choose characters, styles, contrast;
- The choice among equivalent formats of the provided contents (text, video, soundtrack);
- The availability of informational and suggestive directions.

However, technological accessibility is not sufficient to provide a really accessible environment able to include all the differences.

The students of an online course may have individual differences (physical, psychological, visual, auditory, etc.) as well as different learning styles and different intelligence types (Gardner). Furthermore, e-students are placed in areas that may be geographically very distant; they have completely different tasks, plans and learning paces according to their working or family duties. Other differences may be represented by their competences and ability in the use of technological instruments.

Starting from the principles of Universal Design, developed in North Carolina by the group of architects guided by Ronald Mace and based on the idea of architectural accessibility, during the last decade the principle of Universal Instructional Design (UID) have been developed in order to conceive and design educational services, instruments and environments suitable to the widest possible range of diversities.

Burgstahler (2007) describes UID as:

> ... the design of instructional materials and activities that make the learning goals achievable by individuals with wide differences in their abilities to see, hear, speak, move, read, write, understand English, attend, organise, engage, and remember. Universal design for learning is achieved by means of flexible curricular abilities. These alternatives are built into the instructional design and operating systems of educational materials – they are not added on after-the-fact. (p. 1)

Acquiring the paradigm of Universal Design and Design for All, as it has been defined in Europe, means embracing the viewpoint of designing objects and environments as accessible and usable for everyone, in order to simplify and improve everyone's life, not only the life of the disabled persons. What is needed is a planning method mainly focussed on the construction of products and environments, including digital ones, which must be accessible to any person, with or without disabilities, in order to make the education and active participation opportunities really equal for everyone, regardless of age, gender, competences and culture.

> Design for All is the intervention in environments, products and services with the aim that everybody, including future generations, regardless of age, gender, capacities or cultural background, can enjoy participating in the construction of our society, with equal opportunities and hence being able to participate in social, economic, cultural and leisure activities. Its objective is also for users to access, use, and understand any part of the environment in an autonomous way. (Design for All Foundation).

Universal Design is based on seven principles:

- Equitable use: the design must be intended for usability, in order that everyone has the same opportunities; it must be identical for everyone where possible and equivalent where it isn't;
- Flexibility in use: the design must accommodate individual preferences and abilities;

- Simple and intuitive use: the design must be easy to understand, regardless of the user's experience, knowledge and language;
- Perceptible information: information must reach the user effectively, regardless of his sensory abilities and ambient conditions;
- Tolerance for error: minimize the consequences of accidental or non-intentional actions;
- Low physical effort: the interaction with the environment must be efficient, comfortable and require the minimum of fatigue;
- Size and space for approach and use: optimize the approach and the manipulation capacity, regardless of the user's size, posture or mobility.

It is clear that these principles can provide a strong indication to the design of virtual learning environments, directing the choices of design processes and instruments within the Learning Management System (Elias 2010).

The analysis carried out by Elias on the Moodle platform highlights that software can be directed and shaped in a flexible way through its different options and can be adapted to include a large amount of diversities and to enable the constructive interaction among the persons involved.

This implies an actual collaboration among the technological component part, which deals with the technical aspects, the pedagogical component part, which is in charge of providing the conceptual matrix of the learning experience, and the users component part, which is involved in providing feedback to help to improve the design itself.

This procedure and this design method intend to put first the individual and his chance to participate from the very first steps of the design process, without having to use assistive or compensatory technology later, which could prove to be insufficient, inadequate or in any way discriminatory.

3. Conclusions

On the one hand the use of the Web as an informational and educational context creates opportunities to overcome individual problems thanks to the spatio-temporal flexibility. On the other hand, it can lead to overestimate the technological dimension and to focus on how to improve the access to information by using the best technology. As explained by Mayer, this approach is technology centred, it is based on the "capabilities of multimedia technology" and it answers the question "How can we use cutting-edge technology in designing multimedia presentations?" This is one of the approaches commonly used in designing learning environments based on multimedia resources and, therefore, on the Web.

A second approach reverses the issue. Instead of starting from the technological dimension, it takes into account especially the role and the activities of the student focusing on "How people learn" and "How the human mind works", trying to answer the question "How can we adapt multimedia technology to enhance human learning?" (Mayer, 2001).

If the design lets itself be guided by this second approach, technology will be chosen and directed towards the users' needs, in order to create environments characterised by acceptance, orientation, collaboration, co-construction, that are the conditions to develop personal and social empowerment through the actual participation of every person to the real and digital community.

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All the sitography references were consulted on the 30th September 2013.