

User Centred Design and Universal Design approaches for enhancing the learning technologies

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Introduction

Living in a hyperconnected world and looking at the new technologies, with special regards to *Information and Communication Technologies* (ICT), the research is aimed at finding new designing scenarios for improving learning and teaching practices for disabled users, who very often are socially excluded. The Convention on the Rights of Persons with Disabilities, states itself, the relevance to undertake or promote research and development of, and to promote the availability and use of new technologies, including ICT, mobility aids, devices and assistive technologies, suitable for persons with disabilities, giving priority to technologies at an affordable cost.

To this aim, within the framework of ICT for learning, the assistive and adaptive technologies which include a range of devices (hardware, furniture, computer screens, software and so on), are usually employed to enable anyone to work more healthily, effectively and with equal access to the technology regardless of any impairment or disabilities. Similarly, e-learning and m-learning platforms, born as electronic educational technologies, are largely in usage nowadays as networking environments to promote the integration and guide learning through flexible architectures based on current standards of web accessibility, platforms and content format (WAI - W3C).

In this complex scenario, the foreground role of the Ergonomics in Design may help to develop inclusive solutions, thus enhancing the learning potential for all users. This is carried out thanks to approaches *User Centred Design* (UCD), which often are revised in a widest *Universal Design* (UD) perspective.

Method

Focusing on the design and development of inclusive solutions for a greatest number of users, including disability carriers, the potential of a bottom-up approach combining UCD and UD processes was explored. To reach this goal, the first step of the work involved the analysis of the user needs, degrees and types of disabilities, taking into account the *Assistive Technologies* (AT), as well as the e-learning and m-learning platforms. Besides this, the involvement of expertise who working in the field of interest, as psychologists and pedagogues, was very useful to accomplish the objectives to be achieved. During this phase, the degree of Usability and accessibility of devices and platforms for learning was assessed, and then, analyzing the flow of activities enabling the achievement of specific objectives (Task analysis - referring to the UNI ISO 9241), were identified critical issues and defined the first design guidelines. The final step led us to simulate human-computer interactions by means the *Scenario-based-Design* method, which allows to describe existing activities, to predict or imagine new activities that can be produced by the interaction with a new products.

Results

From the results achieved some drawbacks on the effects of the ICTs in the society have been highlighted. On the one hand they are characterized by a strong potential on the other one, may generate social exclusion. With the aim to improve social inclusion within the society, ICTs should not restrict the accessibility to technological platforms and its tools, but should be able to improve the educational experiences based on the networking cooperation.

Summarizing, accessibility may be conceived as an approach which considers the entire learning process and not only the technological aspects.

Finally, guidelines for designing ICTs for learning should be meet the following requirements: direct access contents / resources, providing contextual information and guidance, adjusting levels of difficulty, range of selectable input, access to interaction and collaboration tools (chat, forums, wiki), integration with the physical environment, making clear through the "mark-up" the use of natural language, use of "interface metaphors" and "similarities" to simplify complex issues and reduce the cognitive load.

Discussion

Research highlights the need to implement existing systems through design solutions that promote social inclusion, supporting not only the accessibility, but also autonomy, socialization and the ability to collectively build new meanings. Ultimately, UCD, UD and specific skills applied to the area of the Design, can play a strategic role in the development of innovative products for learning.

Keywords

Universal Design , User Centered Design, Information and Communication Technology, Human-computer-Interaction, Virtual Learning Environment, Assistive Technologies

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