ABSTRACT

Nowadays the use of distance learning systems is widely extended in engineering education. Moreover, most of them use multimedia resources that sometimes are the only educational material available to provide certain educational knowledge to the students. Unfortunately, most of the current educational systems and their educational content present accessibility barriers so some students cannot access to these educational resources. This paper introduces IMES, an inclusive system designed to ensure that students of all abilities can access the educational content of the system. But, are all the students (not only students with disabilities) satisfied with this kind of inclusive applications? Are they useful for all the students? One hundred and eight students participated in the evaluation of the system during an academic course at Universidad Carlos III de Madrid. The evaluation shows that the system presents educational benefits to all the students in terms of usefulness and user’s satisfaction.

Keyword: Distance Learning, Education for All, Inclusive Education, Universal Access to Learning Contents, Web Accessibility

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INTRODUCTION

The advance of the technology in the last decades and its use in learning environments have force the revision of thinking about how we learn and how we teach. Nowadays, many individuals and institutions have abandoned their prejudices against learning that occurs outside of the classroom, mainly due to the arrival of new communication technologies that allows effective distance learning systems, frequently marked as e-learning or on-line learning systems. (Moore and Kearsley, 2011).

In the educational environment and, specifically in distance learning systems, the use of multimedia learning contents continues increasing (Daskalakis and Tselios, 2011). Electronic books, educational software, e-learning platforms, etc. are now used as assistance tools, complementary resources, and sometimes even as the only material available to provide certain contents within the educational system.

Multimedia learning contents should be easy to access and use in order to ensure learning quality. Moreover, these contents should be available to any student, with or without disabilities, regardless of their access characteristics and use contexts, taking into account that students could use assistive technology such as screen readers, refreshable Braille displays, speech synthesizers, magnifiers, adaptable keyboards, software for voice recognition, etc. to see, hear, move or interact with the information (Moreno et al., 2007).

The use of technologies in educational systems, and specifically in multimedia contents, could suppose accessibility barriers to many students (with or without disabilities): new technologies usually need good Internet connections (high band-width, etc.), high hardware specifications (RAM memory, HDD, etc.), specific software to be installed in the computer for accessing the system (a specific player, plug-in, codecs, etc.), specific infrastructure or equipment, etc. All of them could suppose accessibility barriers which could affect to all students, not only to students with disabilities.

In order to provide full accessibility to the educational resources to every student, it is necessary to provide universal access to the resource and, at the same time, to the learning content included in the multimedia resource, regardless of the student learning and access characteristics.

Instructional technologies present the opportunity to offer universal access in education, increasing e-inclusion in the information society. These inclusive methodologies need to be carried out following accessibility standards, guidelines and Universal Design Principles (IMS, 2004; ISO, 2008; ISO 2012) to obtain accessible products such as multimedia resources and web-based applications.

In this paper, IMES (Inclusive Multimedia Educational System) is presented. IMES is an accessible Web-based educational system (a distance learning system) that includes accessible multimedia resources such as images, interactive elements, audio, video, data tables, graphs, scientific expressions and mathematics, etc. IMES is part of the APEINTA project, which has been awarded with the FIAPAS prize as the best research project in education area dealing with audio disabilities and with the 2011 Web Accessibility Challenge (Delegates Award) in W4A conference sponsored by Microsoft. This study has been partially founded by the MA2VICMR (S2009/TIC-1542) research project.

The paper is structured as follows: the next section backgrounds the research work. The section following presents the design and development of a high quality Web prototype of the system, focused mainly in accessibility issues. Two sensorial impaired persons (one hearing and one visually impaired person), four potential students without audio-visual disabilities and two accessibility experts participated in the design and development of the system.

Moreover, the educational benefits that the system provides for the students in terms of usefulness and user’s satisfaction are evaluated. One hundred and eight third-year Computer Science students at the Universidad Carlos III de Madrid participated in this evaluation.