

## Chapter 2

# A General Framework for Inclusive Lifelong Learning in Higher Education Institutions with Adaptive Web-Based Services that Support Standards

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### ABSTRACT

*The chapter introduces some key issues of a general framework to support the full participation of students with functional diversity issues (i.e. disabilities) in the learning process by covering the full life cycle of service adaptation at Higher Education institutions. This support is achieved in terms of combining universal design approaches and personalization techniques. Firstly, standards and specifications that try to cover the wide range of possible user needs are considered. Secondly, dynamic contextual recommendations are applied during the course execution to provide the inclusive personalization support. The approach is designed for Higher Education institutions, which are required to integrate this inclusive support into their existing services infrastructure. This framework is analyzed in the context of the EU4ALL project. In particular, the authors of this chapter describe the key components where the research has focused; specifically service based recommendations in order to support some adaptive and inclusive end-user services at UNED.*

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## INTRODUCTION

Technology should support the needs of Higher Education (HE) institutions and individuals for autonomous and dynamic creation of Lifelong Learning (LLL) communities and of new distributed e-learning services. The chapter introduces some key issues of a general framework to support the full participation of students with functional diversity issues (i.e. disabilities) in the learning process by covering the full life cycle of service adaptation at HE. This support is achieved combining a twofold approach. On the one hand, universal design approaches that are based on standards and specifications that try to cover the wide range of possible needs are used. On the other hand, personalization techniques draw on dynamic contextual recommendations, which are applied during the course execution. The approach is designed for HE institutions, which are required to integrate this inclusive support into their existing services infrastructure.

The objective of this chapter is not to present how much accessible a Learning Management System (LMS) can be or how to build yet another LMS that is more accessible than the existing ones. The objective of this chapter goes far beyond LMS with a focus on describing a general framework that can be applied into HE to facilitate the learning autonomy of their students, including those with disabilities. This framework should accommodate existing and future services available to the institution members (i.e. students, faculty, administrative staff) in an intelligent web-based environment; it guarantees support and extensibility making a pervasive use of educational standards. The framework is required to develop the full life cycle of service adaptation, which is, by nature, a step-wise process where different roles and needs (i.e. course designers, tutors and learners) should be supported. The approach draws on combining universal design, modelling techniques following standards and specifications that try to cover the wide variety of user needs,

and personalization features that offer dynamic contextual recommendations during the course execution.

In this chapter, we present this framework and illustrate its application in the EU4ALL project, where we concentrate on a scenario at UNED and comment on components that are on the focus of our research.

The chapter will be structured as follows. The next section introduces the background and the motivation to support functional diversity issues in the context of the LLL paradigm and presents how technologies can turn into both a barrier and/or an opportunity, depending on the way they are applied. Universities cannot be left aside to these needs, but they are much involved in the process. The approach proposed to accommodate these needs in their technological infrastructure will be outlined in the background section.

The third section focuses on the personalized features to be provided in LLL scenarios in order to cope with the teaching and learning process in an inclusive way. This is achieved by taking into account that all the services to be delivered are strongly dependent on the management of individual and group profiles and their relationships with contents and context of use. Besides, all of them entail modelling activities focused on adaptive and personalized processes. Instructional design issues are also relevant at setting the educational objectives of the system, and designing the interaction in a way that facilitates achieving those objectives. This implies learner's requirements being met, which means incorporating scaffolding into the context, tasks, tools, and interface of software learning environments.

The fourth section presents a general framework to leverage learning autonomy for disabled students at HE. It introduces the general framework that allows the full participation of disabled students in the learning process, and describes mainly those components where our research group has been working on. The technology focuses on attending the learning needs of the students in a

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