Chapter 2.10
Integrating Ontology-Based Content Management into a Mobilized Learning Environment

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ABSTRACT

This chapter describes the architecture of an ontology based content authoring system, developed according to the challenges emerging from Bologna process deployment in Hungary. Considering the needs of Hungarian academic sector, mobility of learners has also been treated as a key requirement. This system has several fundamental components: an educational ontology–which also serves as the domain of curricula development, a content developer, a content repository, and an adaptive knowledge testing engine with a test bank. The services and learning objects are distributed towards the students through a mobilized learning management system.

INTRODUCTION

On 1st February 2008 Carl-Henrich Sandberg, the CEO of Ericsson announced: *"There are now 3.3 billion mobile subscriptions in the world – and every month an additional 50 million people in the world start using their first mobile phone. Broadband is the next step with both mobile and fixed broadband growing rapidly. This figure of 3.3 billion mobile subscriptions far outstrips all previous forecasts."*

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Competition between eLearning solutions is increasing at an alarming rate, while changes of the surrounding environment and the demands of students and the labour market are frequent and substantial. As the announcement of Sandberg indicates, the importance of mobile technology in mainstream education is inevitable. At the same

time several questions regarding this impact have not been answered yet. Several factors put pressure on higher education institutions to turn towards the development and application of innovative and modern technologies that enable students to easily access, understand and apply complex curricula and other teaching materials.

In this chapter a comprehensive learning environment will be discussed, emphasizing its mobile learning aspects and potentials, stressing its importance in the Bologna System.

We divided this work into two main parts.

In the first part a detailed problem analysis is given about motivating factors behind this project. As it will be visible, the Bologna-process indicated important challenges for the Hungarian higher education, which need to be dealt with. Innovation in education provides competitive advantages for universities therefore, as we argue in this chapter, a combination of an ontology based learning content management with mobile devices enabled content delivery is certainly a solution. Still in this section we show the results of an important empirical research, which examined students' attitudes towards mobile learning. These results are being incorporated into the design and development processes, but also into the deployment strategy of our ontology driven educational environment, namely Corvinno Studio. Further sections discuss the inclusion of mLearning in higher education and other strategic issues of mobile learning deployment.

The second part of the chapter is more technical oriented. It describes steps and important concepts of an ontology based content development system implementation. This system rests on two major pillars. One is a repository layer that has a key role in content development and management. The other one is an ontology layer that supports the creation of reusable learning objects (based on the Educational Ontology) and the promotion of reliable knowledge testing (Adaptive Knowledge Testing System). Mobile learning adds flexibility to this system, since individual learners are not bound to a certain location or time anymore, however the mobilized content is still connected to traditional lectures and seminars. Topics of educational ontology, Studio system architecture, content development and delivery are argued in separate sections. At the end we talk about the first user experiences and our future plans.

SECTION ONE: BACKGROUND

Problems with Bologna System

The Bologna Process is the most important higher educational reform created by European education ministers, inspired by the demand for suiting the requirements of labour markets. On June 19th 1999, 29 European Ministers responsible for higher education signed the Bologna Declaration that contains the aims of this process (European Commission, 2005). With their signature they declared the creation of the European Higher Education Area.

This European Higher Education Area is structured around three cycles where each level has the function of preparing students for the labour market, for further competence building and for active citizenship. This also requires formulation of such descriptors for bachelor and master programs that can be shared within Europe and be used for a variety of purposes, depending on particular national, regional or institutional contexts and requirements. Members of Joint Quality Initiative aimed at developing descriptors for bachelor's and master's that might be shared within Europe and made available for a variety of purposes, depending on particular national, regional or institutional contexts. This was one of the first initiatives, which provided support for facilitating comparison of degrees. The launch of these Dublin descriptors also indicates that competences should have a key role in providing transparent and comparable curricula and qualifications (JQI, 2004). At the same time, methods that enable comparison of