Study on the Pedagogical Optimization of Learning Management Systems for e-Learning in Technology Education

Ramon Anibal IRIARTE CASCO

1. Introduction

This dissertation was carried out to optimize the educational use of Learning Management Systems. Rationale and procedures proposed for this work are based on several premises: a) Learning Management Systems (LMS) are computer applications extensively used in educational institutions; however, they can not be properly described as virtual learning environments; b) In order to become authentic virtual learning environments, Learning Management Systems require human intervention (usually teachers) that will define specific ways to combine resources available on the system to achieve pre-defined learning objectives; c) A pedagogical optimization of Learning Management Systems should target an efficient interplay of computer and human capacities to provide engaging online learning experiences that respect students’ individualities and adapt to their educational interests and needs.

2. Results and Discussions

The premises outlined above rendered a theoretical framework to optimize LMS, with a four-dimensional structure: (1) A diagnostic exploration of LMS; (2) The design of a method to develop educationally sound LMS; (3) The development of tools to optimize a selected LMS; and (4) The formulation of recommendations for effective teaching and learning practice in optimized LMS.

A comparative assessment was carried out among five open-source e-Learning platforms to identify the most suitable experimental context for pedagogical optimization. The comparison revealed that despite conceptual and structural differences, all systems explored contain quite a similar set of basic facilities.

Technical features were in general better assessed than didactical qualities.

Instructional Management Systems Learning Design (IMS-LD) packages were used to carry out a pedagogical optimization of Moodle. A fully functional IMS-LD player for Moodle was developed and an experiment was organized over four weeks with a group of students and teachers. Findings indicated that IMS-LD based experiences on Moodle seem able to provide activities that are more individualized, better sequenced, more relevant for students’ interests, and able to promote adequate levels of critical thinking.

The IMS-LD and IMS Metadata specifications were combined with a student modeling approach based on learning styles and multiple intelligences to experiment with adaptive learning on Moodle. An online learning experience was carried out to explore the pedagogical impact of the adaptive IMS-LD package with a group of students clustered into an experimental and control group. Pedagogical aspects, usability and learning outcomes were measured. Results suggested that the provision of adaptive learning activities may significantly improve students’ learning outcomes.

3. Conclusions

According to the experimental results presented in this dissertation, the proposed framework can be successfully employed to optimize the use of Learning Management Systems. Moreover, the combination of a Learning Management System with IMS-LD packages and the IMS Metadata seems to provide an adequate context for enhanced educational experiences that better suit students’ interests and needs. Nevertheless, findings from these experiments should be extended to include larger and more diverse groups of students interacting online over more extended periods in different activities.