



## Integration of ICT tools in an Engineering Postgraduate Master Program

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Structural and methodological implications of the European Higher Education Area (EHEA) in undergraduate and postgraduate studies constitute a new interplay between students and lecturers. Lecturers now act as learning counselors and the students actively participate in their learning process instead of being passive receptors of knowledge as in conventional teaching systems (Bolonga Process, 1999). Thus, computer tools and Information and Communication Technologies (ICT) play an important role due to their interactive characteristics (Sharpe et al., 2003). This work presents the combination and integration of three ITC initiatives carried out and applied within the Master Program on Environmental Hydraulics for the acquisition of capacities and abilities in the autonomous apprenticeship of courses related to Engineering and Hydrological studies.

1) Firstly, an e-book was developed where basic principles and utilities of Geographical Information Systems in hydrological studies can be found. Files are included in order to carry out a complete guided study case.

2) Secondly, a self-assessment tool was developed in order to constantly lead and support the resolution of a real study case through hydrological modeling (Aguilar et al., 2009). Thus, once the lecturers posed and solved a study case, the self-assessment tool was developed allowing the students: to access suggestions step by step along the resolution process; to evaluate the results obtained before the final deadline; to look up other previously solved cases, frequent questions and bibliography (e.g. the e-book in section 1). With this tool, the students can: face the difficulty of a hypothetical hydrological study as in the real world; have to follow the basic steps in hydrological studies with the technical and computer tools commonly used; make decisions when data are lacking or with technical difficulties, etc.

3) Finally, a 3D interactive graphic tool was developed to acquire training and experience in Engineering Project Management (Taguas et al., 2009; 2010). With this tool, basic concepts and the different steps of the building process of different Engineering projects are clarified in the classroom avoiding field campaigns.

The three tools remain available online at any time at several websites (Master Program, Research Group, Personal web pages etc.). The practical experience with the three of them has been very positive in the last two academic years. The autonomous approach in the apprenticeship and the use of the ICT tools stimulated the development of personal abilities, the analysis of information and the synthesis of the design process, elaboration and execution of a project or study case. Besides, the execution time was optimized by the students, avoiding constant direct contact to the lecturer and the risk associated to field campaigns.