Introducing ICT in a Traditional Higher Education Environment: Background, Design, and Evaluation of a Blended Approach

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ABSTRACT

Traditional higher educational learning practise is based on the information transfer model where knowledge is passed from the experts (tutors) to the learners (students) by means of lectures and text books. New educational models based on constructivism can be used in parallel with traditional learning introducing a blended (or enhanced) learning approach. In such a blended environment, organisational, educational and technological issues need to be considered as a whole. In this work, we describe our experience and evaluation results from the introduction of such an enhanced model in a traditional higher education institute. The focus of this effort is to build a flexible and cost-effective model based on three key concepts: Web technology, simulation and adaptation. Initial evaluation has showed that the traditional learning process has boosted student productivity and resulted in a more relaxed educational experience. Results were based on access log analysis in the frame of a computer science undergraduate course. The evaluation sought to measure the impact of this pilot application on current practises and pedagogy.

Keywords: asynchronous education; case study; educational technology implementation; higher education; software architecture; Web applications

INTRODUCTION

The widespread adoption of information and communication technologies (ICT) has enabled the realisation of technologically advanced tools for e-learning, online collaboration and content delivery (Bates, 2000; Pittinsky, 2002). Although technology offers impressive possibilities to e-learning other factors such as the underlying pedagogy, educational models, flexibility and
cost effectiveness are often overlooked. The plethora of advanced tools supporting e-learning and the difficulties in their adoption in real situations has only demonstrated that the primary need is a paradigm shift in the current, information transfer educational model (Hiltz & Turoff, 2002; Xenos Pierrakeas, & Pintelas, 2002).

Many researchers have proposed that this shift should focus on knowledge construction which will enhance, not replace, the traditional information transfer paradigm (Etheris & Tan, 2004; Warschauer, 2003). Social learning is a major enabler of the knowledge construction paradigm: active collaboration among human peers is supported by using different kinds of collaboration technologies and especially, enhanced presence. Human learning is a social process, through sharing and executing tasks in order to reach a common goal. In this context, learning is not an isolated activity (Hung & Nichani, 2001).

In this work, blended (enhanced) learning is considered as a mixed educational paradigm: traditional learning methods are supported by e-services. E-services are designed with the sole purpose to maximise the impact of traditional methods and cover their drawbacks or flaws. A major requirement is that both methods should complement each other in the best possible way in administrative, educational and technological terms. This kind of mixed learning (traditional and Web-based) is not a new concept: major investments in similar learning environments in universities and other higher education institutions across the world have been made in recent years. Most such efforts involved small scale, single institute adoption of Web-based tools which have drawn some useful conclusions (Bender, 2003; Haywood, Anderson, Coyle, Day, Haywood, & Macleod, 2000; Jefferies, Thornton, Alltree, & Jones, 2004; Saunders & Klemming, 2003). Cross-institution (Van Weert & Pilot, 2003) or nation-wide (Demb, Erickson, & Hawkins-Wilding, 2004) efforts were small in number but significant in impact.

Past examples have only showed that information technology alone does not generate learning. A community informatics approach where a coordinated effort involving pedagogy and technology planning alike is needed (Jackson, 2004; Warschauer, 2003). The endeavour presented and analysed in this work is such a single-institute effort which strives to answer more extended questions: how e-learning can enhance the quality of the learning process for higher education students, how such a solution can be cost-effective, what are the most appropriate implementation technologies, what are the appropriate pedagogical models and finally how users (academic staff and students) are affected. The motivation stems from the vision of creating new, student-centric e-learning models that are both pedagogically and cost effective. Research focuses on a case study designed for the course of mathematics in a Greek higher education institution.

The tools used for enhancing traditional procedures are focused on three aspects: learning by doing through simulations, social learning through on/off-line collaboration and personalisation through adaptation. The first two aspects are already implemented while for the third a cost effective methodology, based on an existing log analysis tool is proposed. The overall goal is to use a simple, yet powerful and cost-effective Web assistance environment for maximising learning efficiency.