Discovering the campus together: A mobile and computer-based learning experience

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ABSTRACT

One of the most relevant difficulties faced by first-year undergraduate students is to settle into the educational environment of universities. This paper presents a case study that proposes a computer-assisted collaborative experience designed to help students in their transition from high school to university. This is done by facilitating their first contact with the campus and its services, the university community, methodologies and activities. The experience combines individual and collaborative activities, conducted in and out of the classroom, structured following the Jigsaw Collaborative Learning Flow Pattern. A specific environment including portable technologies with network and computer applications has been developed to support and facilitate the orchestration of a flow of learning activities into a single integrated learning setting. The result is a Computer Supported Collaborative Blended Learning scenario that has been evaluated with first-year university students of the degrees of Software and Audiovisual Engineering within the subject *Introduction to Information and Communications Technologies*. The findings reveal that the scenario improves significantly students' interest in their studies and their understanding about the campus and services provided. The environment is also an innovative approach to successfully support the heterogeneous activities conducted by both teachers and students during the scenario. This paper introduces the goals and context of the case study, describes how the technology was employed to conduct the learning scenario, the evaluation methods and the main results of the experience.

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1. Introduction

One of the aspects that make first year students drop out or persist in engineering majors is the way they face the transition from high school to university. Psychological studies discuss the importance of emotional and social competence during this transition (Parker et al., 2004). West (1991) claims that the more integrated students are in the social activities of a campus environment; the more likely they are to success in their studies at university.

In addition to the difficulties due to the development of effective emotional and social competencies to settle into their new lives, students must overcome practical problems brought about by the academic environment, such as locating lecture rooms, the secretary and using the services provided by libraries in the campus. When arriving at their university for the first time, most of the first-year students do not know either the services or resources offered by the institution. Nor do they know how to exploit these services until the end of their studies (Anderson-Rowland et al., 2004).

In Spain, this situation is compounded by the European Higher Education Area (EHEA, 2010), which was introduced in universities, including Polytechnics, in 2008. The EHEA system is competence oriented. Learning strategies beyond the traditional ones (e.g. studying the syllabus of subjects) are introduced in order to develop the specific and transversal skills that are necessary to become a good professional. One of the strongest points included in the engineering curriculum is the development of collaborative work skills, as engineers are professionals who work in groups and collaborate for developing large projects (Martínez-Monés et al., 2005). Thus, learning how to interact with colleagues is essential for students of engineering to develop their future career.

First-year engineering students often show motivational problems during the first year. Experts consider that the main reason

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is their poor knowledge of their future professional world, and highlight the need of bringing students closer to practicing engineers. As stated in Haag and Collofello (2008): "*To shed a positive light on engineering, advisors, faculty, and teaching assistants can show applications of the coursework so the students can connect what they are studying to the 'real world'*".

New approaches are needed to help first-year students to deal with these difficulties and facilitate their transition to university in the three aspects mentioned: (1) introducing them to the campus and services, (2) making them familiar with the EHEA methodologies and collaborative work skills and (3) fostering their interest in technology and their future career. Different studies have developed technological solutions that address partially these three issues. Sticklen et al. (2009) proposed replacing lecture sessions with web-based, voice-over slide presentations punctuated with full screen demonstrations and interactive quizzes to improve students' attitude towards engineering. Müeller (2004) discusses an e-mentoring system to connect students to practicing engineers or scientists that increases students' confidence in succeeding in their studies and their wish to pursue their career. Courter and Anderson (2009) proposed including interviews with practicing engineers as part of the first-year student curriculum and show how this improves students' motivation and understanding of engineering practice.

We consider that explaining the services available at university and the information that can be found on the web is not enough for a first and effective contact with the new learning environment (campus, community members and activities). It is also necessary to facilitate and support students' first-hand experiences with the services distributed around the campus to foster their motivation and interest in the new environment. The potential of mobile and interactive technologies to improve communication among students and provide more contextualized learning experiences in different spaces beyond the classroom has attracted considerably research (Cook et al., 2006, 2008; Roschelle and Pea, 2002). Projects such as *Savannah* (Facer et al., 2004), *MyArtSpace* (Sharples et al., 2007) or the work by Schwabe and Goth (2005) show that interactive experiences involving an active exploration of the environment improve students' motivation. Thus, we propose a learning setting that: (1) integrates activities in the classroom and around the campus, (2) involves students as a way of increasing their motivation and (3) helps them to discover the campus, their new classmates and university methodologies.

To meet these needs in an integrated manner, this paper presents a case study of an innovative Computer Supported Collaborative Blended Learning (CSCBL) scenario, which was carried out with first-year engineering students at Pompeu Fabra University (Barcelona, Spain). The scenario is structured according to the Jigsaw Collaborative Learning Flow Pattern (CLFP). A CLFP aims at capturing the essence of well-known techniques for structuring a flow of learning activities to potentially produce effective learning from collaborative situations (Hernández-Leo et al., 2005). With this CLFP we intend: (1) to foster collaboration amongst students so they can meet each other and (2) to integrate the set of activities into a coherent flow of learning activities. We encourage the active participation of the students and facilitate their first contact with the environment through a set of formal and informal activities, which take place in different areas of the campus. We developed a technological environment combining different network and computer applications to ensure the integration of all these activities and ease their orchestration. The experience consists of three phases. The first one takes advantage of mobile phones and Near Field Communication/ Radio Frequency Identification (NFC/RFID) technologies to support an exploratory informal activity around the campus; in the

second phase, the students use computers to work collaboratively on a formal presentation about their exploration of the campus; and, the third phase, is an online Web questionnaire for students to reflect about the whole experience.

This case study illustrates the suitability of generating innovative blended scenarios combining formal and informal activities conducted in different spatial locations with significant learning benefits. We seek to stress the value of conducting this type of CSCBL experiences to both enhance students' motivation towards technology and introduce them to the services which are of benefit for them to carry out their studies. Moreover, we show how technologies and collaborative learning techniques complement each other in generating innovative collaborative computing experiences which facilitate effective learning

Next section introduces the educational context in which the case study was carried out and defines its main requirements. The implementation of the CSCBL scenario and the supporting technological environment developed are detailed next. The following section summarizes the evaluation of the case study by presenting the evaluation objectives, methodology and main findings. Finally, the main conclusions and a discussion of future research lines are presented.

2. Description of the case study, context and CSCBL scenario

2.1. Educational context

The case study was conducted within the framework of Information and Communication Technologies Introduction (ICTI), a compulsory subject for first-year students of three ICT engineering degrees (Computing, Telematics and Audiovisual Systems) offered in the new curriculum of Pompeu Fabra University (UPF). The subject aims at giving a global vision of UPF and its resources. The subject is also an introduction to the professional ICT world and includes an activity to introduce students to the campus and its services.

The new curriculum includes methodologies which make use of technology to support group work and the development of oral and written communication competences. UPF uses Moodle (Dougiamas et al., accessed 2010; Moodle, 2010) as the platform to manage the content and communication needs. This case study promotes the aforementioned skills through a collaborative learning scenario, which is based on the Jigsaw CLFP (explained later) being applied to a blended learning context. The activity is designed to help students become familiar with the campus, learn about the services offered and meet other classmates. By including technology as a learning support, the experience also aims at increasing the motivation of first-year students, since they could see how innovative technology can be employed into real-life contexts. 241 students ranging in age from 18 to 25 years participated in the experience.

2.2. The CSCBL scenario: Jigsaw CLFP applied to a blended learning scenario

The Jigsaw CLFP organizes a complex learning flow for a context in which several small groups face the study of a lot of information for the resolution of the same problem (Hernández-Leo et al, 2009). The activity flow is structured into three phases: 1) an individual or initial group studies a particular sub-problem, 2) students involved in the same sub-problem are grouped in *Expert groups* in order to exchange ideas and 3) students are grouped in *Jigsaw groups*, which are composed of one expert in each sub-problem, to solve the whole problem. This pattern provides students with three educational benefits: positive