Chapter 59
Teaching and Learning Requirements Engineering Based on Mobile Devices and Cloud:
A Case Study

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ABSTRACT

Organizations have suffered a large (r)evolution at social, economic and technological levels. The increasing number of mobile devices on day-to-day of the general population and particularly among youth people, leads to the emergence of new paradigms in several areas of activity, particularly in education. As an example of a new paradigm in teaching and learning process, mobile learning supported by cloud environments and Bloom's taxonomy could be appointed. In this paper and in the context of a course of 1st cycle, following the guidelines of courses in Information Systems provided by ACM / AIS, it is proposed the use of Google tools, aligned with Bloom's taxonomy, the model Blended Mobile Learning-Context Oriented in a Requirements Engineering course.

INTRODUCTION

Higher education in general and higher education institutions (HEIs) in particular has undergone a great change for the different approaches used in the teaching-learning process (TLP) toward using the new devices and infrastructure.

According to a report by Ambient Insight Research, the U.S. market for mobile devices reached $958.7 million in 2010 and there is a projection for 2015 of 1.82 billion dollars. The ubiquity of hetero-

geneous mobile devices is hard to ignore. However, to take advantage of this trend is necessary to think beyond the formal, and start thinking about the performance of the support, i.e., today's devices mobile capabilities were unimaginable a few years ago, namely, persistent storage, displays, main memory and communications, among others (Quinn, 2011).

Currently, there is no consensus on the cloud computing definition; however, the definition produced by NIST is the most suitable (NIST, 2012). A key feature of this paradigm is scalability on demand, where the user pays for the amount of services that are really used (Armburst et al., 2010). Thus, the problems of space and sharing of documents has become a reality facilitated through the use of the cloud, particularly, with Software as a Service (SaaS) model.

In this context, the most emergent topics for research in these areas have their origin at the intersection of cloud computing, services and ubiquitous computing. Thus, four research areas were identified: 1) pluggable computing entities, 2) transparency of data access, 3) adaptive behavior of applications in the cloud, and 4) automatic discovery of application quality (Mei, Chang & Tse, 2008). In this research work, directly related to point 3) a proposal for a model and a case study that links education, mobile devices and cloud computing are presented.

The electronic learning environments could provide some facilities to learn complex concepts indirectly; students still encounter difficulties in coping with the complex concept of the requirements elicitation. More importantly, understanding the technical terms requires hands-on practice rather than mere theoretical learning. Learning via electronic environments, also called e-learning, utilizes electronic and telecommunications technologies for information delivery, especially for educational purposes. With the introduction of e-learning, most traditional learning limitations regarding learning times and places are now addressed in e-learning environments. Although e-learning technology offers different types of electronic learning environments such as web-based learning environments (WLE) and mobile-based learning environments (MLE), mobile-based learning has become an important modality used in e-learning environments, and more recently, the Blended Mobile Learning (BML) model (Khaddge, Lenham, & Zhou, 2009). Thus, it is necessary to, firstly, examine whether the solutions are according to the pedagogic aspects needed to be considered for teaching and, secondly, determine which type of content and how they should be available to students, i.e. to identify the learning context.

The TLP based on the model BML Context Oriented (BML-CO) (Moreira, et. al., 2010), on the one hand, leads to (1) the necessity from the existence of applications for mobile and fixed devices, and (2) the learning context, i.e., when? where? and why? a student intends to study with the support of a mobile device. On the other hand, leads to the selection / use of different software applications. Since the introduction of mobile devices in TLP, a large number of applications for different domains have been identified as previously mentioned. In most cases these applications are presented "in a flat fashion" that makes your selection / use particularly difficult. In this context, a web-based architecture was introduced from BML-CO model (Moreira et al., 2010) for the areas of programming, computer networks and information systems.

In the area of information systems, teaching and learning Requirement Engineering (RE) is a core subject for a three-year courses Bologna Process European Degree structure at HEI, in Portugal, following the Curriculum Guidelines for Undergraduate Degree in an Information Systems from ACM/ AIS. Students usually learn RE as a chapter in an Information System course, in which it is expected that they, at the end of the course, are able to (1) Select and use techniques in requirements engineering process according to the problem to be solved; (2) Evaluate and use different techniques for prioritizing

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