Chapter 92
ESEIG Mobile:
An M-Learning Approach in a Superior School

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ABSTRACT

In recent years, mobile learning has emerged as an educational approach to decrease the limitation of learning location and adapt the teaching-learning process to all type of students. However, the large number and variety of Web-enabled devices poses challenges for Web content creators who want to automatic get the delivery context and adapt the content to mobile devices. This paper studies several approaches to adapt the learning content to mobile phones. It presents an architecture for deliver uniform m-Learning content to students in a higher School. The system development is organized in two phases: firstly enabling the educational content to mobile devices and then adapting it to all the heterogeneous mobile platforms. With this approach, Web authors will not need to create specialized pages for each kind of device, since the content is automatically transformed to adapt to any mobile device capabilities from WAP to XHTML MP-compliant devices.

INTRODUCTION

In ESEIG (Escola Superior de Estudos Industriais e de Gestão) - of the Polytechnic Institute of Porto - we use a Learning Management System (LMS) to provide access to the learning resources and activities. In a recent survey (see section 3) we verify that a large number of students use mobile devices. They are already experienced with mobile technology and are eager to use their devices in e-Learning scenarios. Another argument for the use of mobile devices came from the students' profile since most of them are already employed while studying in part-time. This situation decreases the chance to attend virtual events synchronously. Moreover, we also noticed that the students present different mobile devices with different characteristics that difficult the user experience

regarding the access to mobile content. Based on these facts, we argue the need to automatically deliver uniform educational content on particular devices, normally referred as content adaptation.

In this article we explore the use of open source technologies to provide a better design experience regarding mobile learning (m-Learning) content adaptation and promoting the "write once run anywhere" concept.

To understand the needs of our students we based on a survey conducted by a group of teachers at ESEIG. The aim of this study was to characterize the mobile devices usage, namely, the diversity of mobile technologies and services used by students and teachers, and analyze the future expectations concerning the usage of m-Learning platforms.

Based on this survey we obtained the basis for the ESEIG-Mobile system architecture. The ultimate goal of ESEIG-Mobile is to standardize the delivery of e-learning content to the mobile devices of our students. This system uses a three-tier model on a client–server architecture in which the user interface, functional process logic and data access are developed and maintained as independent modules. For each module, our concern was to use emergent and open-source solutions to leverage the potential of this new e-Learning paradigm where the characteristics of the mobile device of the student represents an important role and, at the same time, a huge issue. The large number and variety of Web-enabled devices poses challenges for Web content creators who want to automatic get the delivery context and adapt the content to mobile devices. This requires a thorough analysis of the available technologies and knowing good practices to help addressing this issue.

The remainder of this paper is organized as follows: Section 2 defines context delivery and enumerates several initiatives working on this subject. In the following section we present a survey made in our School regarding mobile devices. Then, we introduce the architecture of ESEIG Mobile and the design of its internal components. The next section we validate the ESEIG-Mobile

prototype system based on the students' access statistics. Finally, we conclude with a summary of the main contributions of this work and a perspective of future research.

MOBILE CONTENT ADAPTATION

Mobile learning (m-learning) applications extend the electronic learning (e-learning) experience into the mobile context (Chang & Sheu 2002; Chen et al., 2002; Liu et al., 2002). M-learning uses mobile devices to enhance the teaching-learning process. However, it should not be seen as just another e-Learning channel for delivering the same content. In fact quality M-learning can only be delivered with an awareness of the special limitations and benefits of mobile devices (Parsons & Ryu, 2007). Due to those constraints the learning content must be adapted to suit the mobile device characteristics. Adaptation means a process of selection, generation or modification of content (text, images, audio and video) to suit to the user's computing environment and usage context (Parupalli, 2009). The concept of Content Adaptation is commonly related to mobile devices. Due to the variety of types and technologies supported they require special handling through a series of content transformations, in the deliver process, made by the content provider (server) (Zhang, Kunz & Hansen 2007). Instead of authors having to create specialised pages for each kind of device, content adaptation automatically transforms an author's content to match the device characteristics. Some examples of such features are related with their limited computational power, small screen size, constrained keyboard functionality and media content type supported. The W3C Device Independence Working Group described many of the issues (Lewis, 2003) that authors must face in an environment in which there is an increasingly diverse set of devices used to access Web sites.

One approach is to use the common capabilities of the mobile devices and ignore the rest. Finding

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