Moodle-Based Software to Support the Learning of Web Programming

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ABSTRACT

New educational trends demand learning processes that fulfill the requirements and interests of students. In this sense, developing new activities focused on specific themes for the open source e-learning platform Moodle, provides the added value of offering their integrated use in the learning environment. Basing on this assumption, Moodle applications for checking JavaScript and PHP codes have been developed, allowing improving the learning process in web programming University courses. These applications offer the students information about the committed errors and about the key terms of the programming language. Moreover, they also gather information about the type of errors committed by each student so that the teacher can graphically observe which concepts are more problematic and need to be clarified. The paper also describes the result of a qualitative analysis of its use in several courses offered in study programmes of the University of Valladolid.

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1. INTRODUCTION

“Education and Training 2020” (ET 2020) is a new strategic framework for European cooperation in education and training that builds on its predecessor, the “Education and Training 2010” (ET 2010) work programme (European Union, 2009). “Education and Training 2020” emphasizes that education and training have a crucial role to play in meeting the many socio-economic, demographic, environmental and technological challenges facing Europe and its citizens today and in the years ahead. Efficient investment in human capital through education and training systems is an essential
component of Europe’s strategy to deliver the high levels of sustainable, knowledge-based growth and jobs that lie at the heart of the Lisbon strategy, at the same time as promoting personal fulfillment, social cohesion and active citizenship. The “Education and Training 2020” strategic framework states four common strategic objectives for Member States, one of which is “Improving the quality and efficiency of education and training.” The team involved in the present work takes special attention to this strategic objective, and considers that in order to improve the quality and efficiency of education and training, it is necessary to count with tailored open source tools that can provide adequate solutions to specific learning scenarios. For this reason, the team decided to develop code validators for programming languages studied in a University course dealing with web applications development, which would allow implementing a tailored blended learning project for that course, supporting this way the implementation of the European Higher Education Area (EHEA) (http://www.ehea.info/) as it is understood by the Bologna declaration (EHEA, 1999).

Besides the enthusiasm of the team to implement a high quality and efficient learning project as promoted by the European Union in the “Education and Training 2020” framework, an important starting point for the present project is the work developed by the World Wide Web Consortium (W3C) (2011a) in the field of code validation, and more specifically, the code validators for (Extensible) Hypertext Markup Language ((X)HTML) (W3C, 2011b), and Cascading Style Sheets (CSS) (W3C, 2011c) that have been satisfactorily used by the students to check their own codes.

At this point, the idea of developing code validators for other programming languages arises. A search in relevant literature revealed that there were no equivalent validation services to those provided by the World Wide Web Consortium for (X)HTML and CSS, for other programming languages such as the client-side JavaScript or the server-side PHP scripting languages, that together with (X)HTML and CSS, are studied by students in web programming courses. It is true, however, that engines or interpreters are available for both JavaScript (Google, 2010) and PHP (http://www.php.net/) but a pedagogic use cannot be made of these applications as they are. For this reason, the team decides to develop code validators for JavaScript and PHP that could be used for pedagogic purposes, and to integrate them in the open source virtual e-learning platform Moodle (http://www.moodle.org) currently used by students, so that they perceive the code validators as tools adequately integrated in their usual virtual learning environment, unlike those offered for (X)HTML and CSS by the World Wide Web Consortium.

As the number of students that regularly attend the course involved in the experience is low, around 20-40 per semester, it was decided to base the analysis in qualitative procedures, i.e., to observe the students’ opinion, both the opinions expressed verbally as well as those expressed through the different discussion forums created for this purpose.

This paper is organized as follows. In Section 2, we present the context of the work. Section 3 describes the learning tools. Section 4 gathers the results obtained; and finally conclusions are drawn.

2. CONTEXT

The participants in the present work are a group of teachers of the department of Signal Theory and Communications, and Telematics Engineering of the University of Valladolid. The course for which the applications have been developed is a course focused on web applications development and is part of several engineering study programs offered by that University.

The present work is twofold, on one side, it is an open-source software engineering project that has as result, a software product, on the other side, it is also an open source e-learning project. More specifically, the result will be a set of modules integrated in the open source virtual e-learning platform Moodle, that allow
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