AIM-Mobile Learning Platform 3.0: Design of new functionalities to integrate smartphones in the teaching-learning process

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Abstract

The combination of Learning Management Systems (LMS) with smartphones is gaining importance in Higher Education studies. Therefore, we have designed a responsive virtual environment, AIM-Mobile Learning Platform, focus on integrating smartphones in class. It permits teachers to send real time questions and learning packets with multimedia resources to students through their smartphones. As the environment instantaneously processes every student response their continuous progress is automated. Moreover, the environment permits to manage teachers, subjects and students by means of a generic interface that can be applied in many educational disciplines. The new version includes more functionalities to promote their consolidation in Education. It integrates an installation and configuration package to provide high flexibility for Institutions as they can intall it in their own servers. Besides, we have complemented the existing quantitative evaluation system with a qualitative functionality based on positives and negatives taking into account the participation of students in class. Finally, the new version allows students to design questions with the aim to build knowledge. These strategies seek to increase the motivation, implication and attention of students in subjects, promoting a constant feedback inside class, which helps students to be more conscious of their self-learning process.

Keywords: Learning Management Systems (LMS); m-learning; Bring-Your-Own-Device; build knowdlege; learning feedback.

1. Introduction

The new Higher Education System requires more flexibility of the learning and teaching process, promoting the learning capacity, the motivation and autonomy of students in the adquisition of skills and the development of new methodologies to improve the continuous progress of students and to enhace the motivation of teachers. Besides, it may be very appealing to promote a natural interaction between teachers and students inside and outside classes in order to improve the quality of the teaching process. These objectives can be dealt with the integration of e-learning and m-learning (mobile-learning) strategies inside the educational scenario Jin (2009) Alli (2009). In connection with it, these new strategies encourage the use of personal devices (tablets, smartphones, laptops) in class, integrating the idea of BYOD (Bring-Your-Own-Device), that is becoming quite popular in many educational systems. In fact, students feel more confident with their personal smartphones when dealing with some learning task. On the other hand, LMS systems have increased their presence in many many educational courses. In fact, Capterra (a learning software guidance company) and the e-learning industry (the largest community of professionals involved in the eLearning industry) corroborated in the last research, Capterra (2016) e-elearning Industry (2016,) that the most used LMS platforms during 2016 were Edmodo, Moodle and Blackboard Capterra (2016b). Therefore, m-learning and LMSs become a strong point in the support of BYOD inside classes Sangani (2013) Emery (2012).

In previous papers, we described the design and case of use of a novel responsive LMS called AIM-Mobile Learning Platform, a multifunctional environment that consists of a server software application (used by teachers) and a client application (used by students) Debrán et al. (2014). The environment can be directly used in multidisciplinary education contexts and it is available in English and Spanish. The first prototype was applied in Telecomunication, Education and Industrial Technology degrees with satisfactory results Debrán et al. (2016). In the preliminary versions, the environment provided functionalities to automatize a real time and continuous progress of students through smartphones, the design of electronic books with didactic resources and the management of subjects, students and teachers in an integrated way. However, the last version aims to consolidate the virtual environment as a powerful software learning tool. Indeed, the new version includes improvements and new functionalities to enhance the learning process. In summary:

- An installation and configuration package of the virtual learning environment.
- A qualitative and individual assessment functionality of students.
- A secure and robust register and access process to the student application.
- A functionality that permits students to generate knowledge and assess classmates.

2. State of the art in LMS software

LMS software is extensively used in many Higher Education courses and Institutions. For

example, Edmodo is a free learning platform that uses the social network concept permitting students join to one closed group Edmodo (2016). Teachers can share educational resources and evaluable questionnaires to assess students. However, if several teachers share a subject, they cannot visualize the educational resources or other teachers, because teachers access to their personal account. Moodle one of the most important educational platforms, is very powerful and versatile but the great number of implemented learning modules, makes the platform complex to configure and the access from smartphones becomes slow Moodle (2016). Blackboard permits teachers to carry out evaluation tasks, resources management and synchronous/asynchronous communication with students Blackboard (2016). However, both of them require a payment of licences. Other applications, such as the Classroom application, helps teachers to organize educational tasks and to share resources with students. However, since it belongts to the Google Apps tool packet for Education, it needs to download the Google Calendar, Google Doc, Gmail or Google Talk applications. On the other hand, Socrative and Kahoot!, allow teachers to send multiple choices questions to students using their smartphones Socrative Kahoot! (2016). After responses come in, teachers can show the results in class, leading to a real-time competition between students. However, they do not provide others functionalities of the learning-teaching process.

Analyzing these alternatives, none of them comply with every requirement. In fact, some of them are commercial; others need to integrate several software tools and others do not implement some educational tasks. In contrast, our proposal focus on developing a virtual environment in which teachers can easily create contents and make evaluation tasks mobile-oriented. The platform seeks to improve the real time relationship between teachers and students, helping teachers to monitor classes and students and adapt their methodologies to enhance the quality of the learning-teaching process.

3. Global design of the responsive LMS AIM-Mobile learning environment

The virtual environment consists of two applications, the server application and the client application. The server application is used by teachers and the client application is used by students (Figure 1). The server application is programmed in Java and Spring Java (2016) Spring (2016) since it has been designed for web access (more intuitive for teachers).

Figure 1.Global design of the virtual environment AIM-Mobile Learning Platform 3.0.

The view layer was designed with the Thymeleaf Java library Thymeleaf (2016) as it is the best suited for serving XHTML/HTML5 at the view layer of web applications. Furthermore, it was also implemented using bootstrap Bootstrap (2016) to provide Cascading Style Sheets (CSS) CSS (2016) and Javascript Javascript (2016). In contrat, the student application is available for Android, iOs and for web browsers. Therefore, it was programmed using the Apache Cordova platform Apache (2016) that permits to build native mobile applications. Together with Apache, we used Sencha Sencha (2016), since it provides HTML5-based app development tools and services for building mobile applications that run on any device. In the next sections we explain the new functionalities of the AIM-Mobile Learning Platform 3.0 and the learning objectives we want to achieve.

4. New functionalities of the teacher software application

4.1. Installation package of the virtual learning environment

One interesting functionality of the new version is the development of an easy and intuituve installation package of the platform (available in English and Spanish), so that whatever Institution can installed it without high computing skills (Figure 2). This functionality provides a powerful tool for their diffusion in different educational contexts and disciplines.

Figure 2. Intallation package of the software teacher application.

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4.2. Functionality to configure the virtual learning environment

In connection with it, the new version permits to activate and desactivate functionalities inside the teacher application (Figure 3 (a) and (b)). It can be very useful for Institutions or teachers since they can adapt the virtual learning environment to their particular case of use. This new functionality only can be managed for the administrator of the platform, and it gives high versatility and flexibility for. As it can be observed in Figure3(a), the administrator activates and desactivates functionalities by pressing on buttons "Activate" "Desactivate". Once the administrator adapts the platform, teachers only can view and consequently access to the activated functionalities of the principal menu (Figure 3(b)).

4.3. Design of a cualitative and individual assessment functionality of students

The assestment funcionality of the previous versions is quantitative, massive and compulsory, as students have to answer the questions launched by teachers. However, it should be very appealing to complement it with an individual and optional qualitative assessment to check the continuous progress of students (Figure 4). Then, it was programmed a new functionality where teachers can assign positives and negatives to students, based on their participation as implication inside class. This strategy looks for encouraging the motivation and participation of students to achieve good marks. This functionality it is also available for laboratory classes where student are grouped.

(a)   *(b)*

Figure 3. Selection of the functionalities of the learning platform (a) Configuration (b) View of the final menu.

Figure 4. Qualitative assessment of students based on positives and negatives

5. New functionalities integrated in the student software application

5.1. Design of a flexible and secure access to the students application

This version permits to install the platform in whatever server or computer, so the student have to initialize the connection with the specific server to stablish a session (Figure 5 (a)). Once the connection is verified (Figure 5 (b)), students sign in the application and they access the main menu (Figure 5 (c)). This functionality provides high flexibility to the learning environment since Universities or Institutions can install it in their own servers. Besides, this version provides more robustness and security to the overall system, since students have to register in the environment. They click on the "Sign Up" button and a new view to fill the user name and password is opened (Figure 6 (a) (b)).
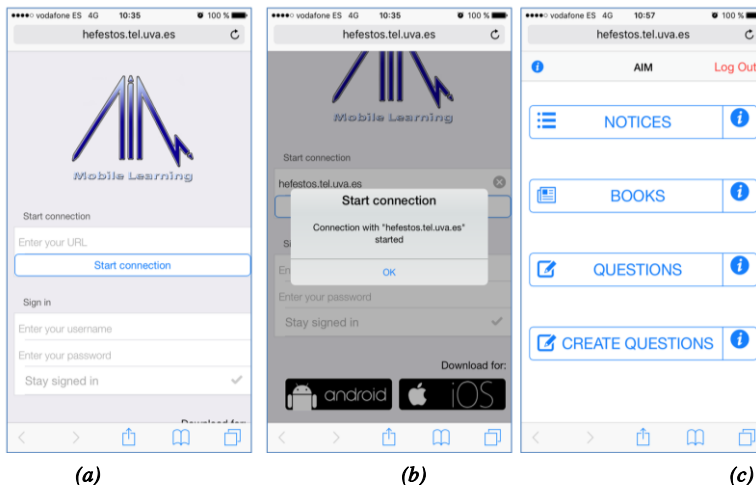

| (a) | (b) | (c) |

Figure 5. (a) initial view of the application (b) connection with the server (c) main menu of the application

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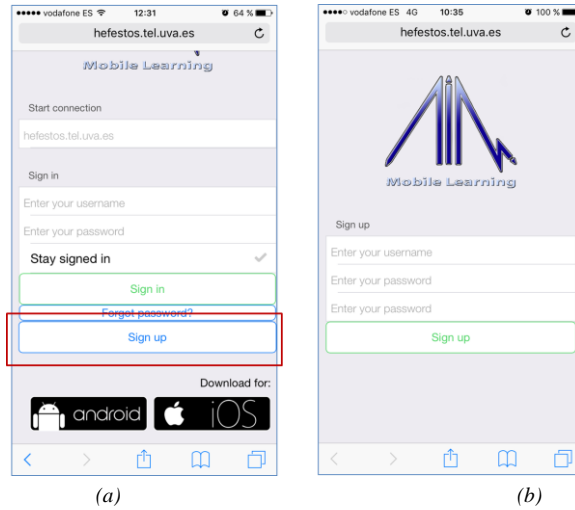

Figure 6. (a) register button (b) functionality to enroll at the learning environment

5.2. Functionality to allow students to generate knowledgement

The use of the learning platform inside class has positively encouraged students to demand more implication with it, asking for designing their own questions to be lauched to their classmates. This learning strategy allows students to build knowledge, promoting a very interesting collaborative process between students. As a consequence, they can check the acquired knowledge inside class and it helps to empower their autonomy, motivation and work capacity. To use this functionality, students have to press the button "Create Questions" in the main menu (Figure 7 (a)). Then, students have to fill the statement of the question (Figure 7 (b)) and the corresponding solutions ("wrong", "correct") (Figure 7 (c)). Finally, they choose the date and time in which the question is lauched.
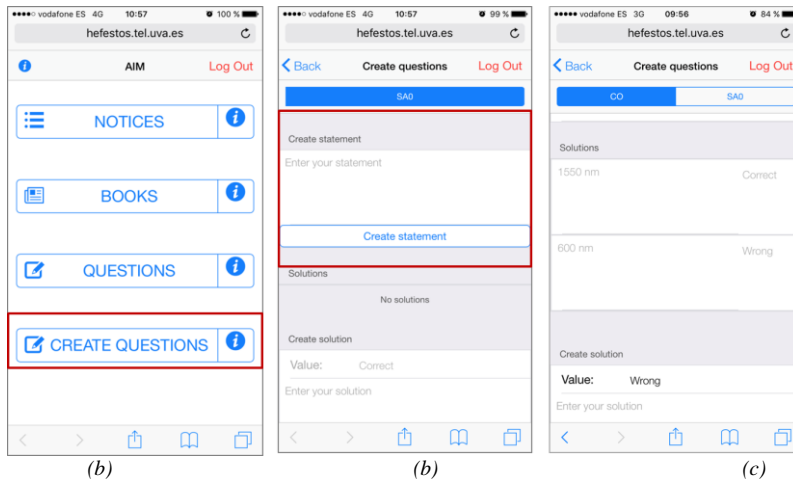

Figure 7. Functionality to design questions (a) main menu (b) fill statement (c) fill solutions.

6. Conclusions

The AIM-Mobile learning platform 3.0 has evolved their functionalities to be more powerful, versatile and flexible for their diffusion in many educational disciplines. This version provides an easy and transparent installation package so that Institutions can install it in their own servers. Besides, it incorporates a qualitative assessment of students based on positives and negatives that complements the existing quantitative and massive evaluation process. This strategy looks for increasing the motivation and participation of students inside class to enhace their continuous progress. Another interesting functionality is to permit students to design questions to be launched to their classmates. It encourages students to build knowdlege and check the one acquired during clasess, improving their learning abilities and increasing their motivation and self-learning autonomy.

Acknowlegment

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