



## Paulex Universitas: A Web-Based Management System To Create, Deliver And Assess Online Language Proficiency

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### Abstract

*The authors will base their discussion on the PAULEX UNIVERSITAS Project; a 3-year project (Sept. 2007 - Oct. 2010) funded by the Spanish Ministry of Science and Innovation being developed by the CAMILLE Research and Development Group at the Universidad Politécnica de Valencia (Spain). The project aims to develop an online system to design, deliver and assess the foreign language exam that is an integral part of the Spanish national university entrance examination. The foreign language exam is compulsory for every student wishing to enrol in higher education. They can choose to take one of the following language exams: English, French, German, Italian or Portuguese. Every year, approximately 27000 students take the university entrance exam simultaneously in the Valencian Community (comprised of 3 provinces: Alicante, Castellón and Valencia) and over 25000 of these take the English language exam.*

*The PAULEX assessment system comprises four modules: the Administration Module to manage users and configure all the system parameters such as control over user access, establishment of user privileges, setting of user deadlines, etc.; the Author Module, an online authoring tool used by language specialists to create exam papers; the Delivery Platform to deliver the online exam controlling student access and learner performance; and lastly, the Assessment Module, used, on the one hand, by the language specialists that belong to a given board of examiners to conduct blind assessment of the students' language exam and, on the other, by the system administrators to publish the marks achieved by students. Because students are entitled to request a revision of their marks by a second and even a third examiner, this module also organises the revision of a given exam by a language specialist from a different board of examiners.*

*The authors will describe the context in which this university entrance exam takes place and they will refer to the current changes in Spanish ministerial policies. They will also illustrate the platform and discuss issues relating to the system's management tools, data security and user interaction. They will conclude by presenting some of the results obtained from a pilot experience conducted in Valencia with more than 200 students and by addressing a number of difficulties encountered concerning the implementation of the PAULEX online examination platform regionally.*

### 1. Introduction

The use of e-learning platforms for teaching and assessing learning provides a wide variety of possibilities for teaching and learning in higher education, mostly thanks to the fact that it facilitates multiple means of communication between teachers and learners by using the Internet. Nevertheless, the new paths opened by e-learning as far as communication through the Internet is concerned, be it synchronous or asynchronous, provokes a higher flow of information in the teaching and assessment of learning processes, thus requiring stricter information control and protection by means of systems of user authentication and encryption among other means of data protection (Kent 1998; Yang 2006).



In this information control process, the IT systems use different kinds of technologies depending on the technological resources available, both hardware and software, to reach different security levels either with academic or corporative purposes. In addition, it is important to bear in mind the current or the developing legislation of the territory where these systems will be used, for instance, the Spanish law that regulates the use of the electronic signature (59/2003 Law - 19 December 2003).

In spite of the fact that there are several technical methods for data protection -for instance, the specific protocols used by banks for Internet transactions-, the IT systems used for teaching and assessing barely reach the minimum security levels despite the fact that universities are increasing the use of these e-learning platforms as a supplement to on-site teaching. Such is the case of the Universidad Politécnica de Valencia (UPV), which uses PoliformaTi, a platform based on the Sakai projectii developed at the Massachusetts Institute of Technology.

The need to protect data is made apparent when these systems are used for student assessment which requires not only protecting the private data from unauthorised access but also the strict control of the actions taken by every user registered on the system. In this respect, it is worth highlighting the fact that since PAULEX was developed to analyse the possibilities of computerisation of the Spanish University Entrance Examinations, security has been one of our prime concerns. In fact, the methods that have been analysed for the PAULEX Platform to control the flux of information have a very high level of security, given the high stakes nature of the University Entrance Examinations in Spanish society (García Laborda et. al. 2010).

The overall objective of the PAULEX Project is to study the possibilities of computerising the foreign language exam which is an integral part of the official University Entrance Examination in the Valencian Communityiii by means of developing a web-based platform and specific tools to be able to design, deliver and assess this exam, as well as a subsequent analysis of all the processes of change involved in its implementation. PAULEX is therefore basically concerned with the development and management of Internet-based language assessment taking into account all the necessary criteria in terms of security, scalability and usability required when simultaneously evaluating a large number of students in selective processes such as the Spanish University Entrance Examination. The PAULEX-Universitas Project is being conducted by the CAMILLE Research Group at UPV who focus their research and development in the field of Computer-Assisted Language Learning (CALL). In general terms, the PAULEX Platform can be described as a multilingual content management system for language learning and assessment which is made up of three main elements: an authoring tool, a content manager and an online assessment system. Its users are divided into 4 main groups: content providers, who design the exam papers; students, who take the language exam; assessors, who mark and evaluate the completed exam papers; and administrators, who manage the entire system. Given its online nature, information is instantly updated and stored on a central server, and user access is conducted by means of Internet security applications such as the use of passwords, IP authentication and the HTTPS protocol. The platform was developed taking the InGenio e-learning platform as a basis and was grounded on its design theories and principles (Gimeno 2007; de Siqueira et. al. 2009).

## **2. The PAULEX Platform users**

One of the main elements of the Platform is its integrated authoring tool, designed specifically for the development and publication of web-enabled language exams and the assessment of these by means of a remote content management environment. The PAULEX users belong to 4 different categories, each of which has its corresponding module (figure 1):

1. Author module: this is the module through which content providers develop and edit the exercises and tasks included in the exams.

2. Student module: delivery module through which students have direct access to the exam papers they have to take after logging into the application.
3. Assessor module: this is the module through which language assessors access the exercises to be marked according to the following criteria: confidentiality, correction and protection of the data of each completed exam.
4. *Administrator module: to undertake all the management tasks of the platform, including users and their corresponding profiles and tasks, while at the same time administering the exam papers and the assessment results.*

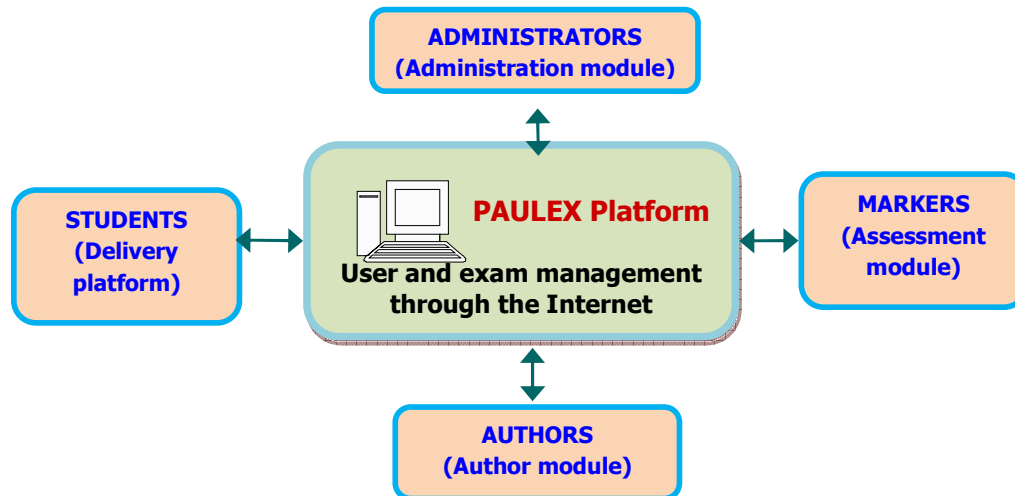


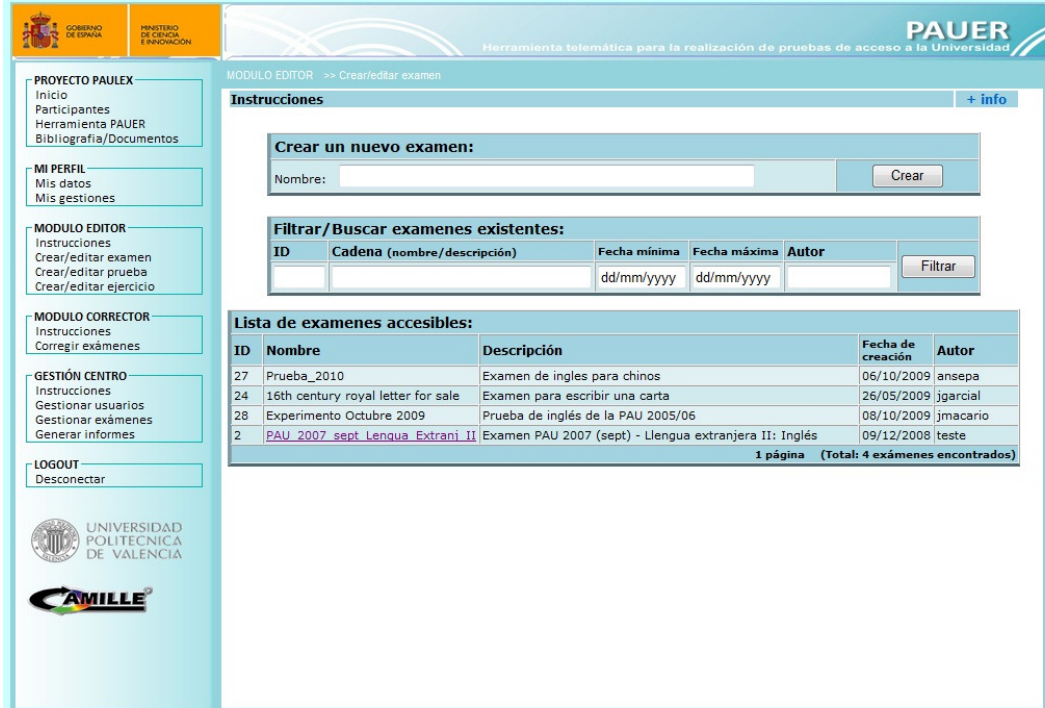
Figure 1. PAULEX Platform users.

Each user has their corresponding permissions to manage their own activities within the system and in order to keep the results reliable only the administrators have access to the main data, e.g. the management of an exam schedule and students or access to the name of a student in case it is required for a revision process.

Once they are registered on the system and depending on the permissions the administrator has given them, the users who take on the role of authors (content providers) can create and manage whole exams, specific tests or exercises. An author can only access the materials created by other authors under the administrator's permission.

The assessor is the user in charge of monitoring their students or the students of a particular course, and therefore they have access to all the activities completed by the students. Due to the fact that exam marking is anonymous on the system, the tutor can access the unnamed exams whilst the identities of the students remain confidential according to the criteria previously established by the system administrator.

Apart from being able to edit personal data and permissions for the rest of the users (authors, assessors and students) the administrator is responsible for the management tasks of exam papers within the platform as well as for adjusting the appropriate system settings in relation to the processes of creation, implementation, marking and analysis of the exam results. Figure 2 below illustrates the vision of an administrator in PAULEX, highlighting the fact that for every section of the main menu there is a control of permissions so as to allow every user to access only the information and functions they are authorised to.



**PAUER**  
 Herramienta telemática para la realización de pruebas de acceso a la Universidad

MODULO EDITOR >> Crear/editar examen

**Instrucciones** [+ info](#)

**Crear un nuevo examen:**

Nombre:

**Filtrar/Buscar exámenes existentes:**

ID	Cadena (nombre/descripción)	Fecha mínima	Fecha máxima	Autor
		dd/mm/yyyy	dd/mm/yyyy	

**Lista de exámenes accesibles:**

ID	Nombre	Descripción	Fecha de creación	Autor
27	Prueba_2010	Examen de ingles para chinos	06/10/2009	ansepa
24	16th century royal letter for sale	Examen para escribir una carta	26/05/2009	jgarcial
28	Experimento Octubre 2009	Prueba de inglés de la PAU 2005/06	08/10/2009	jmacario
2	PAU_2007_sept Lengua Extranj II	Examen PAU 2007 (sept) - Lengua extranjera II: Inglés	09/12/2008	teste

1 página (Total: 4 exámenes encontrados)

Figure 2. Content provider's interface within the PAULEX Platform.

### 3. Structure

The Platform is controlled by a Central Server (CS) located at the UPV through which the administrators can manage access to the available materials and the interaction among PAULEX users. A second server is constantly duplicating all the information from the CS and making backup copies automatically should it be necessary to replace the CS, to work on it or to repair any of its components. The contents and the platform could also be managed and run on other external web servers should the platform finally be implemented to manage and deliver the Spanish University Entrance Examination. In Spain, every autonomous community or region manages its own university entrance examinations. In the Valencian Community, the Department of Education of the regional government is in charge of administrating these exams in collaboration with the public universities located in its territory.

PAULEX is basically structured in two main parts: the Database and the Programme code. The Database is developed through PostgreSQL, one of the most efficient open source database management systems available on the Internet. The multimedia archives saved in the server are also part of the PAULEX database which allows administrators to build up an abundant pool of images and audio and video files, and even the audio files created by the students when completing the oral section of the exam through voice-recording systems. The programme code is especially designed for the web using PHP, HTML, XML and JavaScript languages. Figure 3 represents how users access the platform and adopt specific roles (administrator, editor, student and assessor). PAULEX has been developed intentionally to run with minimal software requirements and to be used in computers with different software and hardware devices. To this end, the system avoids the installation of plug-ins and additional programmes. It also runs on any operating system (Windows, Linux, Macintosh and Unix). The only requirements are a live Internet connection and some specific plug-ins to reproduce audio and video and to record the students' utterances.

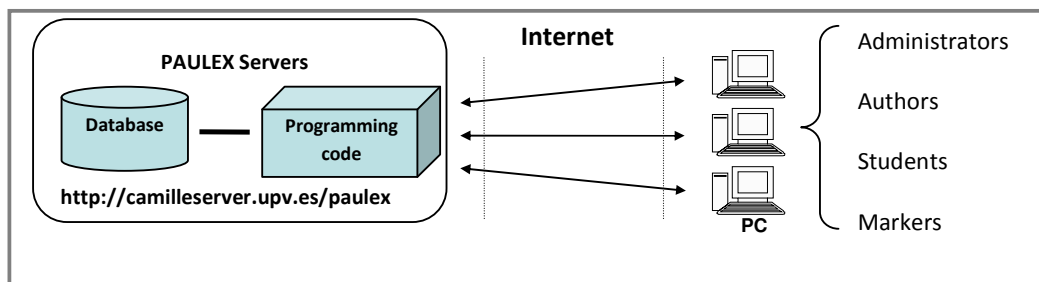


Figure 3. The PAULEX Platform structure and connection.

Authentication is fundamental for users to have access to the platform bearing in mind that they are facing a high-stakes exam that will allow them to choose their university degree. In this process, the users introduce their username and password. They can retry or, if necessary, request their password again. In addition, the PAULEX platform provides users with additional security processes for authentication.

#### 4. The first pilot experience

The project was born as an attempt to design and to test the feasibility of a computer-assisted English test within the official Valencian University Entrance Examination, as some changes in the format and contents of the foreign language exam are going to be implemented in forthcoming years according to the new legislation in force (Real Decreto 1892/2008v). New exam sections will be included to assess the students' listening and speaking skills for the first time ever. As the information included in the new legislation dealing with the renewed exam is very brief and general, the CAMILLE Research Group, comprised of language specialists and computer engineers, designed and distributed a questionnaire at several coordination meetings with secondary school teachers who teach English in the 2nd year of Bachilleratovi from the three Valencian provinces (Alicante, Castellón and Valencia). The main goal was to discover which exercise typologies they preferred. Taking these results into consideration, the researchers designed an online exam delivered through the PAULEX Platform that students took during the first pilot experience. This exam included the evaluation of the four skills: reading, writing, listening and speaking.

Around 200 students in their last year of secondary education participated in this first pilot experience which was carried in several computer labs both at several Valencian secondary schools and at the UPV. The computer engineers only had to do minor adjustments to adapt all the computers to the Platform's specific requirements. For instance, programmes for playing audio and video files were set up. In general, the results have been very satisfactory. The students who took the online exam felt that the Platform is user-friendly, especially when editing their answers, watching video files and speaking to the microphone to record their voice.

There were time constraints in conducting the trials as students could only devote their English lesson and break time to doing the exam. That is why students did only have 60 minutes, instead of 90, which is the duration of the real exam. In most cases, students had sufficient time to complete the exam, which included both listening and speaking sections. Students had to surf the exam and validate their answers and any modifications and send them to the server once they had finished. In the listening section, they watched a number of videos which included content and questions. They were requested to watch the video contents, listen to the questions and then write open text to answer or tick multiple choice questions. The speaking part has been the most interesting one for research purposes. The exam included an attractive image showing logos of social networks and online chat platforms. They had to analyse the image and speak and relate it to their personal likes and experiences (see figure 4

below). They had to record their own voices although in some cases minor technical problems prevented them from recording the whole four-minute slot. Anecdotally, it was obvious throughout the trials that students were extremely shy and remained silent when they arrived at this part of the exam. They did not start talking until one of their partners had done so beforehand. They spoke into their microphones in a low voice so that the system could record their answers, avoiding their partners from hearing or copying them.

Figure 4. Sample speaking exercise.

## Conclusion

To conclude, the PAULEX platform has been presented as a robust tool that would enable the administrators of the Spanish University Entrance Examination in the Valencian region to deliver the English language exam via the Internet. After several years of research, the computerization of this exam has been considered as one of the most achievable alternatives to face the challenges arising from the changes included in the new Spanish educational legislation. The first pilot experience has provided very favourable results and both teachers and students involved in secondary education who have tested the system in real conditions seem to be in favour of its implementation. The experiment showed that implementing a computer-assisted English exam as part of the Spanish University Entry Examination is feasible. A very high percentage of students agreed that they had felt no additional strain while doing it. The results have also been very satisfactory, though teachers and students have been recommended not to think that the marks obtained in the pilot experience will be equivalent to the ones that they would achieve when facing the real exam. Most of the exercises have been

corrected automatically, though personalized correction has been required for the open input sections such as the writing and the speaking tasks.

## Acknowledgments

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<sup>i</sup> For further information on PoliformaT, UPV's virtual learning environment, go to <https://poliformat.upv.es>.

<sup>ii</sup> For further information on the Sakai project, go to <http://sakaiproject.org>.

<sup>iii</sup> The Valencian Community is comprised of 3 provinces: Alicante, Castellón and Valencia.

<sup>iv</sup> There are 5 public universities in the Valencian region: Universidad Jaume I de Castellón; Universidad de Valencia; Universidad Politécnica de Valencia; Universidad de Alicante, and Universidad Miguel Hernández de Elche.

<sup>v</sup> Available from <http://www.boe.es/boe/dias/2008/11/24/pdfs/A46932-46946.pdf>. Last accessed 05/09/2010.

<sup>vi</sup> The second year of *Bachillerato* is the last year in Spanish secondary education. All students wishing to enter university must do 1<sup>st</sup> and 2<sup>nd</sup> year of *Bachillerato* and then take the university entrance examination.