

AN eLEARNING PLATFORM TO SUPPORT VOCATIONAL TRAINING CENTERS ON DIGITAL SECURITY TRAINING WITH VIRTUAL TUTORS AND GRAPHICAL SPATIAL METAPHORES

Ander García, Carlos Lamsfus

Visual Interactions and Communications Centre – VICOMTech
San Sebastián, Guipúzcoa, Spain
{agarcia, clamsfus}@vicomtech.es

Abstract

The recent evolution of Information and Communication Technologies has introduced some important changes in the educational process providing new training and learning methods. Within this context, Vocational Training Centres are increasingly adopting new technologies, especially computer-based, to support both their teaching activities and the training of their personnel.

One of the most important issues arisen by the emergence of new Information and Communication Technologies is the lack of knowledge regarding digital security, including technical media or support, policy, philosophy and culture of digital security.

In order to address this deficiency, we have implemented a full eLearning platform including a Digital Security course. This platform has been developed with the support of experts in security and education and is currently being used by about one hundred professors and educational centres to teach their personnel and pupils about various digital security aspects.

The innovative aspects of this project are the following:

- *The inclusion of a virtual tutor that is easily configured to support the eLearning process with conversational aspects. This tutor has a fundamental pedagogical function and definitively contributes to increase the acquisition of knowledge and to a better understanding of the subject of study.*
- *An advanced graphical user interface based on images, animations and text that increases the platform's user-friendly features as well as the user's satisfaction.*
- *Animations and simulations have also been integrated within the platform to enhance the understanding of concepts, devices and processes. They can be used to test the knowledge acquired by the learners during the course sessions.*
- *a very easy to use authoring tool that permits any traditional user to create content. The authoring tool is based on a template allowing to create animations and virtual tutors semi-automatically with minimum effort. Special features have also been added so that evaluations??(tools ?) can be easily created.*
- *Standardisation The platform has recently been SCORM 1.2 certified and is currently in the process of SCORM 2004 certification.*

Keywords

eLearning, virtual tutors, interaction, animation, simulation, digital security

1. INTRODUCTION

In the recent years the so called Information and Communication Technologies are being increasingly used for different purposes in everyday life. In this context, security of the content is known to be an important issue. This problem has become (even) much more critical with the irruption of the Internet and lots of thousands of Euros are being invested both in the training of IT technicians and in digital security infrastructures.

In the educational field, vocational training centres are examples of organization particularly affected by the problem of digital security. Due to their characteristics, i.e. size, changing personnel, different levels of usage, multiple users in learning phases, new infrastructures, etc., they manage enormous amounts of information and are susceptible of encountering important problems related to digital security. Inappropriate software installation and removal, virus attacks, loss of important amounts of information due to bad usage of computer equipments, etc are likely to be frequent issues in such centres.

In this paper, we present an eLearning platform that has been developed with the aim of fostering a culture of digital security in the daily use of new ICT's by users that are still in their training phase.

Different special features of the eLearning platform are going to be described in the paper, such as advanced graphical user interface, simulations and virtual tutors. For example, eLearning platforms have recently started to use virtual characters to help the user in the learning process. They are human-like virtual characters acting as virtual teachers and thus, giving a "face" to the eLearning program [Pivec, Baumann & Gütl, 2013]. Such virtual tutors have been actually included in this eLearning platform to enhance the application and rise the motivation of the user.

Many efforts have also been made to implement multimodal interfaces that improve human computer interaction (HCI). Important previous work has been carried out in investigating different kinds of mechanisms to make communication between the user and the computer more natural and accessible for all [Jokinen & Raika, 2003]. Some of these aspects have been brought into practice in the application presented in this paper.

2. DESCRIPTION OF THE PLATFORM

We will now present the most important features of the platform and we will make special emphasis in the most innovative aspects to describe the way the learning process is supported in the platform.

2.1 General Characteristics of the platform

eLearning platforms does not aim at substituting the traditional learning environments. But rather, they work as complementary educational tools and therefore, some supervision of the student by the teacher is required. Moreover, students also need to communicate among them as well as with the teachers in order to facilitate their learning process. Thus, the necessary tools for a communicative and collaborative learning, e.g. chats, emails, forums, news, library, download zone, secretary, have been included in the eLearning platform.

Another important requirement of any software application is an intuitive and easy to use interface. In this case, the advanced graphic interface based on links, symbolic concepts with images, texts and animations makes it easier to use the eLearning platform. Furthermore, the interface reproduces the real environment without performance penalization, increasing the platform's user friendly features as well as the users' satisfaction. Last but not least, the interface is dynamic, i.e. there are some changes depending on the hour of the day and the season of the year, as can be seen in figures 1 and 2.



Figure 1: the virtual school during the day



Figure 2: The virtual school at night

2.2 Virtual Tutors

Students using this platform will be both assisted and guided by virtual tutors. The main objective of using the virtual tutors in this eLearning platform is the enhancement of the effectiveness of the learning experience by adding details and completing the information the user sees in the images, animations and general slides.

These virtual tutors have a very important pedagogical function since they do not merely reproduce the content shown in the current page that is being visualized, but they complete it by focusing on the main aspects of the page giving some extra information and further explanations on the issues.

This way, virtual tutors attract the attention of the learner and they contribute to increase the acquisition of knowledge as well as they support the active learning activity that definitely contributes to a better general understanding by guiding the eLearning platform users to their own success, which in the end is the most important thing for every eLearning platform [Sheth, 2003].

In our application the virtual tutor has a woman like appearance and reproduces a text that has previously been recorded (see Figure 3). When selected by the student, it the tutor starts giving an explanation about the content previously recorded by the course generator to guide the student through the lesson. Currently, we are working on the virtual tutor for it to be entirely interactive.

The creation of the virtual tutor is partially automatic. After having selected the appearance of the virtual tutor, a file containing whether the recorded voice or the text to be reproduced by the virtual tutor must be provided.

With the first option, there must be a synchronization work between the movements of the avatar (virtual tutor) and the speech. With the second option, before the synchronization, a professional speaker records the audio file that will be used. Although everybody is able to record the voice of the tutor, professional speakers are the most used. They have special abilities, such as a perfect pronunciation, the tone of their voice and some other factors which contribute to create a better learning experience.



Antes de comenzar con temas puramente relacionados con Seguridad Informática, trataremos los conceptos básicos sobre los que se basa el **funcionamiento de un ordenador**, cuyo conocimiento es necesario para tratar los aspectos de seguridad relacionados con ellos.

Figure 3: The virtual tutor in one of the slides of the course

2.3 Simulations

Besides the inclusion of a virtual tutor, another feature we used to enhance the learning experience was to integrate simulations and interactive exercises.

Simulations mainly appear when a concept, a device or a process is being explained. They can be repeated as many times as the student wants (or needs). They have a very important pedagogical function as they reinforce the knowledge contained in the lesson. Some examples of simulations that are available on the courses are the following:

- Process to disable the preview option on the Outlook Express program;
- The explanation of how a spyware program works;
- The way a firewall uses its tables to allow or to deny a packet; or,
- The steps involved to configure a web server to accept X.509 certificates.

The main function of the interactive exercises is to test the knowledge acquired by the learners during the course. They give the student the opportunity to fulfil a real task in a semi-real environment such as to create a rule to filter some e-mail address, to run an antivirus tool to scan the computer or to add a user to the system and change his/her password.

Simulations and interactive exercises have been developed using Flash and can easily be created, extended, and integrated into the current platform.

2.4 SCORM Compliance

An important effort is being devoted to obtain a standard qualification. Standardization is an important and critical success for technology enhanced learning research and applications as it enables technical and semantic interoperability across eLearning content and infrastructures.

The Sharable Content Object Reference Model (SCORM) aims to foster creation of reusable learning content as “instructional objects” within common technical framework for computer and Web-based learning (ADL, <http://www.adlnet.org>). SCORM describes that technical framework by providing a harmonized set of guidelines, specification and standards. Based on the work of other specification and standard bodies, ADL developed a model for creating and deploying eLearning.

The content created by the off-line authoring tool is SCORM 1.2 compliant and the standardization of the LMS is at the last phase. The architecture of the LMS is based on Microsoft technology, with a IIS server running asp pages and a Microsoft SQL Server. The SCORM support is achieved with a .NET web service on the LMS and an intelligent Java applet on the Client.

3. Results

The features described in the previous sections have been implemented with support of experts in security and education to produce a full eLearning platform and a Digital Security course. The platform has been installed in several vocational training centers where it has been evaluated by a large range of users (teachers and students) in order to assess the usability and user friendliness of the platform.

4. Conclusions

In this paper we have developed a full eLearning platform to address the lack of knowledge of novice computer users in training centres regarding the digital security issues in their daily tasks. We have proposed to enhance the learning experience by integrating various innovative features such as virtual tutors and advanced graphical interface as well as some simulations and interactive exercises.

Following the policy promoted in all contexts within ICT's, and especially within the educational sector, the eLearning platform was certified as SCORM compliant to ensure that the content of the platform can be exported to other standard platforms and that standar content can be imported into our platform. The information interchange is very important in order to get interoperability among different contents and platforms.

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