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

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Abstract

Vocational Training Centers are increasingly adopting new technologies (especially computer based) to support their activities. However, there is a lack of culture in the way such resources can be used safely. We have implemented a full eLearning platform and a Digital Security course with support of experts in security and education, which is being used by about hundred professors of educational centers. The focus of this project is to foster the culture of Digital Security in the aspects of daily use of new computer technologies by typical users in Training Centers.

The two innovative aspects of this project are: the inclusion of a virtual tutor that is easily configured to support the eLearning process with conversational aspects, and the implementation of advanced graphical user interface that follows a metaphor of a real institute, all in a fully web based application. There is also an ongoing work in SCORM compliance adaptation.

1. Introduction

The so called Information and Communication Technologies are being used more and more day after day and the security of the content stored in the different systems has become an important issue. This problem has become much more critical with the irruption of the Internet and lots of thousands of Euros are being spent and invested both in security technicians and digital security infrastructures.

Vocational Training Centres are examples of organisations particularly affected by the problem of digital security. Due to their characteristics, e.g. size, changing personnel, different levels of usage, multiple users in learning phases, new infrastructures, etc., they are susceptible of managing large amounts of information and encounter important problems related to security. Inappropriate software installation and removal, viruses, loss of information due to bad usage of computer equipments, etc…are likely to be current issues in such centres.

In this paper we propose to develop a full eLearning platform to foster the culture of Digital Security in the aspects of daily use of new computer technologies by typical users in Training Centers.

Recently eLearning platforms have started to use virtual characters in order to help the learner in the lessons. They act as "human" faces on the eLearning program, as virtual guides through the course [Pivec, Baumann & Gütl, 2003]. We propose to include such virtual tutors to enhance our application.

There are also many efforts devoted on how multimodal interfaces can improve human computer interaction (HCI). Research is being done on different kind of mechanisms that can be used to make communication more natural and accessible for all [Jokinen & Raike, 2003]. Some of these aspects are being put into practice in our implementation.

2. Methods

In this section, we present the most important parts of the work carried out. First, the main features of the platform are described. Then, we talk about the importance of using virtual tutors in a virtual learning environment, and finally, we describe the simulations available for the student in the platform.

2.1 Characteristics of the platform

The main characteristics of the eLearning platform developed within the project are the following:

- Necessary tools for a communicative and collaborative learning, e.g. chats, emails, forums, news, library, download zone, secretary.
- An innovative user interface which instead of using web-based links, gathers the symbolic concepts with images, animations and texts. Furthermore, the interface reproduces the real environment without a speed penalization, increasing the platform's user-friendly features as well as the users' satisfaction. Last but not least the interface is dynamic, there are some changes depending on the hour of the day and the season of the year, as can be seen in pictures 1 and 2.

Figure 1: the virtual school during the day

Figure 2: The virtual school at night

- A virtual character system that guides the user through the course, improving the effectiveness of the learning experience by adding and completing the information the user sees in the images, animations and text.
- Flash based animations, simulations and interactive exercises that make the user learn by interacting with the content.
- SCORM compliance.

2.2 Virtual Tutors

Students using this platform will be both helped and guided by virtual tutors. The main improvement achieved by using the virtual characters in this eLearning platform has been the enhancement of the effectiveness of the learning experience by adding 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 the student is visualizing, but

they complete it focusing on the main aspects of the page, giving some extra information and further explanations on the issues.

This way, the 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 knowledge acquisition and understanding by guiding the eLearning platform users to their own success, which in the end is the most important thing of every eLearning platform [Sheth, 2003]

In our application the tutor reproduces (see Figure 3) a text that has previously been recorded. When the student selects it the tutor starts explaining the content that the course generator has previously recorded in order to guide the student through the lesson. The virtual tutor has a woman like appearence and we are currently working on it to be entirely interactive.

The creation of the virtual tutor is partially automatic. After choosing the virtual tutor you want to appear at the page, you must enter a file with the recorded voice or the text that will be read by the virtual tutor.

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 speecher records the audio file that will be used. Although everybody is able to record the voice of the tutor, professional speachers are the most used. They have special abilities, such as a perfect pronunciation, the tone of their voice and some other factors whcih contribute to create a better learning experience.

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

2.3   Simulations

Besides the inclusion of a virtual tutor, another feature we widely 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) and they have a very important pedagogical function as they reinforce the knowledge contained on the lesson. Some examples of simulations that are available on the courses are the 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

One of the most important efforts is being devoted to obtain a standard qualification. Standardization is an important and critical success for technology enhanced learning research and application as it enables technical and semantic interoperability across eLearning content and infrastructures.

Standardization work is currently being carried out the platform to be SCORM compliant (ADL, http://www.adlnet.org). The Sharable Content Object Reference Model aims to foster creation of reusable learning content as "instructional objects" within common technical framework for computer and Web-based learning. SCORM describes that technical framework by providing a harmonized set of guidelines, specification and standards. Borrowing from work of other specification and standard bodies, ADL developed a model for creating and deploying eLearning.

In our application, 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

We have implemented the features mentioned in the previous sections 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 (professorsa 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 typical 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 exercices.

The development was made standard compliant to ensure that the content of the platform can be exported to other standard platforms and vice versa, i.e. to get interesting content from other platforms and run it in ours. The information interchange is very important in order to get interoperability among different contents and platforms.

5. Acknowledgements

6. References

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