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**USING GBL IN ECDL COURSES**

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*Abstract: The aim of this paper is to present the activities undertaken by the ECDL Credis Centre during the ProActive project. Nowadays teaching and learning are challenges for contemporary school, and for any other educational system. Within ProActive, trainers were, for a period of time game designers, creating their own educational resources. Also they had the opportunity to integrate video games in real learning contexts. This paper has as special focus on development of two games created in order to support teaching and learning for a module from ECDL certification. This module enables candidates to gain an understanding of the different parts of a computer, as well as some of the key concepts of Information and Communication Technology (ICT), such as those relating to networks and security. Usually, the courses consist in transmitting theoretical information to the students which are in a position of passive receivers. The students are writing down all information and memorize it. For individual study, students have access to one online course. The game designer wanted to bring interactivity in class, which was not possible with the current curricula full of theoretical information. He was aware that his course could become boring, or with too much theory, being hard to keep students' attention for a long time. These learning scenarios have been tested on many groups related to professional training. The process of game design, created games and implementation in current educational practices are also included in the paper.*

**Keywords:** GBL, ECDL, <e-Adventure>, ICT literacy

## I. INTRODUCTION

Starting with January 2010 and until December 2011, University of Bucharest (UNIBUC) through the Open Distance Learning Department has been involved as partner in ProActive project (Fostering Teachers' Creativity through Game-Based Learning).

The project consortium comprises of six partners and the aim of the ProActive<sup>4</sup> project is to create learning contexts in which teachers / trainers / professors covering different areas and levels can foster their creativity in designing their own Game Based Learning (GBL) scenarios. Through Game Based Learning, participants will improve their teaching methods, transforming classes in spaces for collaborative work, participation, problem solving. In this project, educators (participants) used two games editors (Eutopia<sup>5</sup> and <e-Adventure<sup>6</sup>>).

University of Bucharest had as target group professional training and all activities organized were focused on trainers' teaching practices and opportunities for further improvement. Based on trainers' professional background, motivation, interest and availability were included in three pilot

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<sup>4</sup> ProActive: Fostering Teachers' Creativity through Game-Based Learning, is a European project (Lifelong Learning Programme KA3), Project number: 505469-LLP-1-2009-1-ES-KA3-KA3MP

<sup>5</sup> EUTOPIA is a joint venture by ISTC CNR and NAC LAB, Dipartimento di Scienze Relazionali "G. Iacono" <http://eutopia.unina.it/proactive/>

<sup>6</sup> <e-Adventure> is developed by the <e-UCM> e-learning research group at Universidad Complutense de Madrid. <http://e-adventure.e-ucm.es/>

sites of UNIBUC. For the consortium it was presumed that the total would be 18 pilot sites covering different areas and levels, but in total, in the consortium 23 pilot sites were established.

Each partner was responsible in maintaining contact and continuous support for its pilot sites. Once the pilot sites have been established, through training sessions, participants were familiarized with game editors, game based learning scenarios and the process of design was started. In total, UNIBUC has provided nine learning scenarios, created with both game editors.

In the next chapters we will present a case study on using Game Based Learning in training courses, in ECDL CREDIS Training Centre pilot site. In this pilot site, two valuable games were created, using <e-Adventure> editor, and were implemented in training courses: “Buying a computer” and “Installing a computer”.

## **II. ECDL CREDIS PILOT SITE**

The ECDL CREDIS testing centre was established since 2002, as a certified testing centre for ICT competencies. It has eight years of experience in training activities for using Microsoft Office applications and certification process, having more than 1,600 students, 6,000 exams organized and 600 certificated students. The courses address to a large number of persons regardless the age (the youngest student had 13 years and the oldest 57 years), profession and social status.

The courses are organized in seven modules: one theoretical module and six practical modules. The modules are:

- ECDL Module 1 - Concepts of Information and Communication Technology (ICT)
- ECDL Module 2 - Using the Computer and Managing Files
- ECDL Module 3 - Word Processing
- ECDL Module 4 – Spreadsheets
- ECDL Module 5 - Using Databases
- ECDL Module 6 – Presentation
- ECDL Module 7 - Web Browsing and Communication

Each ECDL module provides a practical syllabus of up-to-date skills and knowledge areas which are validated by a test.

The ECDL CREDIS centre offers eLearning courses with a special design and level of interactivity which facilitates learning process. Learning interface is user friendly, easy to understand and offers the possibility to play applications. Students can control these applications, can re-run the simulations until they understand the “educational message”. The buttons allow the student to personalize the study, to go forward or backward, to jump to another paragraph or to another chapter of the course. Every course has also a self-evaluation service that provides the results of the evaluation just in time. Trainings are both face to face (for organized groups) and distance (for individual study). Courses can be accessed any time and anyplace being available online. Through a username and a password received when the student is enrolled he/she can access the courses and online application in order to ensure flexibility of study. In any moment of study he/she can ask for the help of an instructor (both face to face and online). Connection between student – trainer and student – student is permanent, without being limited by space or time.

During the time has been demonstrated that the current approach for study is appropriate taking into account the results obtained until now - percent of promotion – 75-80%.

The ECDL testing centre participated at the focus group organized by University of Bucharest, showing the interest in a future collaboration. Even if until ProActive participation games were not included (only simulation – small flash movies), in courses they intuit the opportunity to use game editors to create educational games for learning and evaluation.

### III. GAMES CREATED IN ECDL PILOT SITE

The process of game design lasted three months. According with trainers statements it was an exciting, interesting and full of unexpected events process. The training provided was not enough so, UNIBUC had to supply the information, offer counseling (both pedagogical and technical) and organize co-design and debriefing sessions in order to obtain best results and learning scenarios. Initially all participants had access to both game editors and they were trained to used them. Based on their teaching experience and discipline(s), each participant (trainer) could decide on the game editor used and also if he/she will work individually or in teams.

The two games were created for a course from ECDL certification (Module 1 - Concepts of Information and Communication Technology (ICT)). This module contains 4 or 5 courses, and enables candidates to gain an understanding of the different parts of a computer, as well as some of the key concepts of Information and Communication Technology (ICT), such as those relating to networks and security.

“Buying a computer” was created for learning computer’s hardware elements and “Installing a computer” is a game created to understand and identify concepts such as: software, application, operating system, antivirus, BIOS, IT legislation. Both games were created by a single trainer. The games can be exported as Learning Objects (LO), self content packages which can be deployed in Virtual Learning Environment (VLE). This feature was used in order to add the games on Moodle platform and to ensure an online accessibility. Another important feature is adaptability of the game to lessons’ content, students’ profile, and age, so on.

#### 3.1. Overview

The game designer wanted to bring interactivity in class, which was not possible with the current curricula full of theoretical information. He was aware that his course could became boring, or with too much theory, being hard to keep students’ attention for a long time.

For creating this game medium technical background is required depending on the games’ complexity, action, story and objectives. Before start creating games, planning activities is necessary and important.

First step is to establish game’s objectives, having in mind the fact that it has to be embedded in a lesson, and final result is learning scenario not only a game. For this reason, each phase of the game must be planned carefully and reviewed in accordance with lesson’s objectives and audience. The game designer will establish the tools that are employed in order to accomplish these objectives, how these objectives are measured, how feedback is offered and which are the strategies to involve students and to motivate them to replay the game, in order to improve their skills and knowledge about computers. All these elements were included by game designer in a storyboard or a conceptual map of the game. Of course, some of the ideas were adjusted along with the development process, according to the constraints implied by the editor, the time and the resources involved.

Second step was to collect the necessary objects/create actions to be found in game environment:

- To create scenes and connect them through the exits;
- To collect/edit pictures, images for each item from the game;
- To upload pictures on the platform
- To add/edit characters;
- To imagine conversations and feedback to the responses;
- Prepare recordings, music;
- Create rules, flags and variables;
- Create and evaluation system.

The games have been created and adapted several times during design phase. The game was reviewed by trainer during the design sessions, in order to respond to quality criteria related to: learning, gaming and technical aspects. Starting with game adaptation to students’ profile, with objectives, players’ immersion during the game, and finishing with graphical aspects, everything was

analyzed and evaluated. Finally the results were evaluated by an external expert before introducing it in classes. Students were also involved in this evaluation process.

### 3.2. “Buying a computer”

This game was created for a facile, interactive and funny way to learn about hardware elements. It was created using <e-Adventure> game editor. According to its designer, “*The game will help the trainees to learn about physical parts of a Computer, and will help me to keep students’ attention on lesson, to create a new learning context in which students to learn through collaboration, discovery, and exercise, to create competition between them in a challenging lesson*”.

The action and the story from the game are important elements for its attractiveness. In this game the player is a costumer who wants to buy all the hardware elements for assembling its own computer. In front of the store (Figure1) he can access the information button and he can read rules and important information about the game and the evaluation (embedded also in the game).

Once he enters, he is welcomed by a shop assistant who tells him that he cannot benefit by specialized assistance and he has to do all choices based on his own previous knowledge (Figure 2). It is also briefly informed about the rules and main buttons that he can and must access, and about the running time: he has only ten minutes until the store closes.



Figure 1. IT Store entrance

The player has to buy only essential hardware components in order to create a functional computer; if he forgot something the computer will not function; if he wants to buy other components will be warned about this; both cases will have effect in final evaluation generated by his action in game environment.



Figure 2. Inside the store

The action during the game takes place in four main scenes:

- Store entrance (Figure 1), in which the player can find information about game rules and objectives that he has to accomplish;

- The store, first room: (Figure 2) is the main scene of the game where the player has access to all hardware components, and also other components and devices. The player can preview each component before buying it. He is permanently supervised by Emma, the shop assistant.
- The store, assembling room (Figure 3). Here the player can assemble his own computer. He has to add all the components that he bought in previous scene. In case he decide that he need other pieces he can go back in first room and buy everything he needs, anytime he wants taking into account the time limit.
- Turn on the computer. Once assembled, the player will discover if he did right choices for computer's hardware elements and if he correctly assembled the computer. The result can vary from a functional computer to a computer in fire (if CPU cooler was not added, for example).



**Figure 3.** Assembling the computer

Once the game was finalized, an evaluation result is returned; the students and also trainer can see the final score registered and also the mistakes and wrong choices during the game. Also, during the game he receives different messages from Emma, so he can adjust his actions and strategy in the same game.

### **3.3. “Installing a computer”**

It is another successful game created with <e-Adventure> game editor, for ECDL courses, first module. In this game, the player will act as an employee for a company which provides IT maintenance. He will be supervised by his boss, Eve, who will decide if he can solve efficient and correct specific tasks (Figure 5). He has to visit a client and to install a new computer, according with client needs and computer's specifications.

Here, he will find unexpected situations and de has to prove good theoretical knowledge about software, licenses, applications and IT legislation.



**Figure 5.** Starting the game

For this game, the learning strategy was different from other game (“Buying a computer”). Here, the player will go through a series of questions and based on its answers he will receive

immediate feedback from Eve and from costumer. These are responses on player's action and answers. If the wrong choices are frequent their reaction will be severe or ironic, still, the player can find from this dialogue important information for further actions in the game (Figure 6).

When the answer is correct the player will have to put in practice the theoretical knowledge. For example, after he indicates correct the Operating System he has to install it; once this installed, the computer's desktop will display the image of operating system.



**Figure 6.** Costumer reaction

In any moment, the player can push the “Installing Completed” button, indicating that he finished the installation process and he prepared the computer which is ready to be used. Now, the character “Eve” will offer him an instant evaluation on his work. It is also important if the customer needs were met and accomplished. Supplementary, the evaluation generated by the game at the end, can help the student to identify weaknesses in his knowledge.

### **3.4. Implementation and results**

The games were included in Game Based Learning scenarios. Implementation in real learning contexts was the most difficult part from this process. Being created for professional training, the end users are usually adults, which are very demanding with the content received. For integrating GBL scenarios in real settings must be taken into account specific peculiarities of the training groups:

- Age (a wide average age from 16 – 18 to 50 years old);
- Background (previous experience in the field);
- Expectation about the course (adults are more demanding with the information received and are focused on objectives);
- The number of learners (usually a group of 20 – 25 students).

These games were played by more than 250 students, included in different groups for ECDL certification. The age of the students included in this experiment is between 18 and 53 years old, with a majority of students between 25 and 35 years old. Both game scenarios were used in face to face sessions and also in distance learning system. The games are available online (on Moodle platform) and also, as a backup solution, stored in computers from laboratories.

Evaluation process was focused students' reaction upon the game and on this new approach. The evaluation tools used for this study were created into the project consortium:

- Trainer's observations
- Online questionnaire for the students.

#### **3.4.1. In-site observations**

Observations in classes were made by trainers during several GBL sessions, in face to face meetings. They observed students' reaction and attitudes toward games and results obtained, the level of collaboration among them and with trainer during and after the game, and their wish to replay the game in order to obtain better results (in terms of time and score).

During the game, the whole class is focused on the game, regardless of students' age. In classes, everybody was playing game individually and they communicated especially with trainers

asking for help about game environment, or in the case of solving issues related to system crash; only in few cases they appeal to colleagues. At the end of the game, most of the students want to replay the game for different reasons: to practice, to obtain a better score / time, and they usually ask for trainer permission.

It was noticed a different attitude between first game experience and second, third. For example, when the students experience the game for the first time, they are eager to start the game neglecting other details: game rules', objectives, scope, and other useful information. The game is perceived as a source of fun and less a source of learning. During the game they notice that they missed some information and ask for trainer's help to obtain it even if these are present in game environment, they are not used to explore the environment by themselves.

In the case of introducing both games in consecutive lessons students are more concentrated on the information offered at the beginning, and they try to link lessons learned with this new challenge. They start to see games as a tool to learn and practice.

When the game finishes, all students start to discuss between, sharing impressions (positive or negative) about game experience, communicating results. Even if they are enrolled in a computer course, and they knew that they will work on computers, introducing games is usually a surprise for most of them.

### **3.4.2. Online questionnaire for students:**

The online questionnaire was created on a base of questions (a specific interview guide) developed into the project consortium. Through this survey multiple aspects related to the game and learning through games were evaluated. The questionnaire was available online, on Moodle platform (<http://activare.credis.ro/moodle>) and students had access to the platform (which contained also the game), through a username and a password provided by trainer.

In this questionnaire were included open questions, letting students to write down their opinion and also multiple choice questions. They were asked to characterize this experience, to describe it using three words, to mention if they consider the game appropriate for the lesson and if this lesson is different from others to argue why. Other questions were related to the game interface, the students were asked to appreciate the appropriateness of the interface and to offer improvement suggestion. We also asked the students if they enjoyed the experience and if they are willing to repeat it. The last question, very important for distance learning system was about the possibility to repeat the game at home/ free time, taking into account the fact that the games are available online. The questionnaire has been applied on different groups only one time for a specific game ("Buying a computer" or "Installing a computer").

The students had positive appreciation on the games, and the learning experience. They mentioned that they've "learned without realizing", seeing it as a very fruitful experience. When they had to describe the experience using three words, the most common words found here were: "attractive", "interesting", "useful", "efficient", "exciting", "stimulating", "educational", "very creative", "entertaining", "challenging", "encouraging", "relaxing", "new", and "motivating". They appreciated the graphical interface, characters, conversations and the subject. It can be seen a slight difference between answers depending on the students' age. Surprisingly, younger students are more demanding about the game itself than older students, but offering many improvement suggestions, coming from their previous experience with commercial computer game.

Students tend to analyze in detail each element of the game, practical aspects, level of interactivity, time for accomplishing objectives and disapprove any malfunction of the system. For a high and positive impact the game should work perfect, without any interruption or system crashes. The students are excited to replay the game at home, with the stated aim of achieving better results (no mistakes, best time, best score).

Most of the respondents indicated that they will repeat the game even if in their free time or at home. This question and the received answers were very important keeping in mind the fact that in distance education, individual study is crucial, and is important to stimulate learning outside the school.

## IV. CONCLUSIONS

Game design is a viable option for educators from different sectors and levels if they want to introduce Game Based Learning approach, without using commercial games which are difficult to integrate with the current curriculum and assessment framework.

The implementation of games in real learning settings offered a validation of the results for the researches conducted during the project. In order to introduce games in lessons it is strongly recommended to plan rigorously time and activities. Unexpected situations can be faced, starting with technical problems and continuing with students' negative response. These games are not replacing theoretical concepts related to the taught subject, but are a solid base for applying them in a virtual environment. Also can be successfully used in self evaluation, which is very important in individual study.

Games offer flexible and safe environments to test and re-test hypothesis, to increase motivation for learning, opportunity to explore new environments using the experiences in real life.

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