Second Life Technological Transfer to Companies: the case study of the CC ICT-Sud Centre

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Abstract

Many well known international business organizations are interested in virtual worlds considered as a valid support to distance cooperation and training.

This paper describes the Second Life experience, gained by the authors to support the distance training activities proposed by the Competency Centre CC ICT-Sud, in the context of a course focused on showing how virtual worlds support collaborative work. The course was targeted to show distance collaboration tools and methodologies to company representatives, public administration employees and graduates auditors. The teaching modalities adopted were both of teaching and collaborative types. The latter allowed to experiment with collaborative methodologies that were introduced in the synchronous distance lectures. The results obtained are, in the main, encouraging.

1 Introduction

The adoption of 3D virtual worlds to embed distance learning activities is spreading more and more (Proceedings of the Second Life Education workshop, 2007). The main reason is the perceived sense of belonging to a community that eliminates the sense of isolation which could reduce the effectiveness of distance learning activities. Also many enterprise organizations are moving in this direction looking for the support of the collaborative distance activities offered by such environments. IBM, for example, now owns more than 30 virtual islands in Second Life used for different purposes, such as the research, the inclusion of new employees and their training, the support to developers and both internal and customer training (IBM, 2009).

Business organizations, IBM in particular, give great importance to these environments for their similarity to the virtual enterprises, heterogeneous enterprises that aggregate, according to the needs of the market. The objective is to merge their skills to create a new company directed to a specific business target. This comprehensive and highly competitive environment requires special skills. Virtual worlds reflect the characteristics of a virtual enterprise because they are distributed and, through role-playing games, can be highly competitive. 3D virtual worlds lead to a strong sense of belonging to the Community (De Lucia *et al*., 2009a), and encourage collaboration. They have a particular significance for experiences connected with the development of leadership (2009 IBM) and help to identify people excelling in this particular attitude, essential to manage virtual companies that are constantly changing and largely require decision-making skills.

It is important to emphasize that, strictly speaking about e-learning is important to focus on "learning", while, many usages of Second Life are focused on "teaching" aspects: technology is used as a synchronous platform to host synchronous distance lessons, conducted projecting pre-loaded slides. Second Life offers large efficacy in supporting collaborative work and learning, because it was born as a multiplayer game online with the functions of a social network (Edward) (2006) and it, therefore, allows the structuring of activities characterized by a common goal.

In this article we present our experience concerning the use of Second Life as a medium to provide business technological training. In particular, the objective of the intervention was the creation of a competency centre structured as a network, in the six Regions of the objective 1 area. The Centre provides technology transfer services targeted for training or retraining of demand and supply, exploiting the state of the art solutions that use ICT technologies. A project work-package included the provision of training activities concerning instruments and technologies supporting the collaborative work within the ICT

sector. This work-package has been provided, partly at distance, to business partners and to public administration staff. In particular, the Salerno node has selected Second Life as a technology for providing distance education and the virtual campus SecondDMI, described below, as an enjoyment environment for collaborative activities.

This article is structured as follows: the SecondDMI virtual campus is briefly presented in section 2; the educational activities carried out during the project are described in section 3; section 4 shows the assessment phases and section 5 outlines the conclusions.

2 The Virtual Campus

Over the past two years various activities aiming at testing Second Life as a medium to support distance learning were undertaken. In (De Lucia *et al*., 2009a) the SecondDMI virtual campus, created using the development tools offered by Second Life, has been presented. The campus is designed respecting the physical appearance of the Department of Mathematics and Computer Science (DMI) of the University of Salerno. The realistic reconstruction is enriched, as shown in the left part of Figure 1, with fantastic projections of developers, such as the transparent inverted pyramid used as a room for conferences.

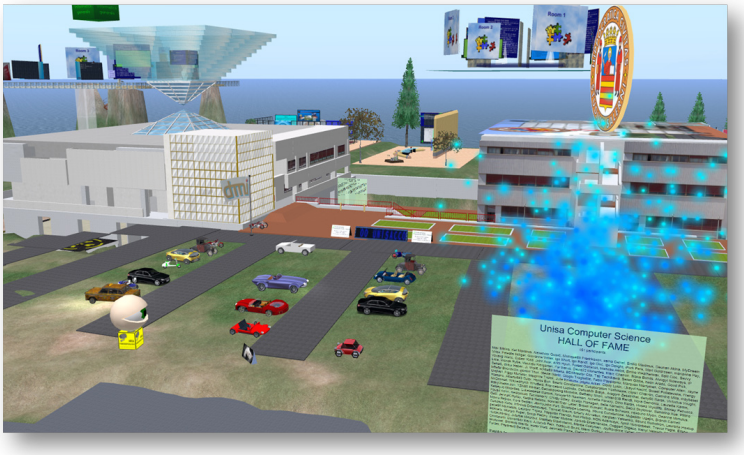

Fig. 1: A SecondDMI landscape

The fidelity to reality in building virtual environments is a subject of discussion (Desiderio *et al*., 2009): some universities organize spaces in a way completely different from reality, many others exactly reconstruct their structures.

In the case of SecondDMI spaces, the second approach was mainly adopted, since, in general, the educational activities are directed to the students of the Faculty of Sciences and familiar places strengthen in learners the sense of belonging to the community of our students.

In particular, the didactic provision modality has been tested for synchronous and collaborative educational activities during a course of General Computing (De Lucia *et al*., 2009b).

Controlled experiments have shown good performance results as well as good impressions of the students who found it easier to communicate with the teacher in this environment than in the front to front lectures and comparably productive working at distance with the colleagues during collaborative activities (De Lucia *et al*., 2009a; De Lucia *et al*., 2009b). As shown by the results, this positive perception can be connected with the perceived sense of belonging to a community, the one of the considered course, as proven by the numerous accesses recorded after the end of the instruction activities. In order to promote the "institutional" activities, the environment has been equipped with a free time location, with group games and tools for the shared use of audio-visual material. The environment has been developed using the Second Life programming language making it possible to add an active behavior to built objects. One of the assembled didactic objects is a slide projector, a movie player linked to a streaming server and a complex environment for the management of meetings (De Lucia *et al*. 2009b).

To support organizational activities and the exchange of didactic material, SecondDMI has been integrated with Moodle, exploiting, at the same time, the support offered by the learning management system to didactic activities.

3 The training activities

During the project, the training activities were provided using Second Life and covered several advanced topics. In particular, a module was dedicated to the methodologies and technologies which support collaborative work. In addition to experimenting the theoretical aspects covered in "teaching" modality, when the professor imparts synchronous front lessons, Second Life was also tested as a platform to support collaborative learning and work. The objective is to support students to effectively learn together, providing them with group working tools. This type of collaboration enables them to strengthen and ensure, at the same time, by interacting with each other, their knowledge and their social dimension. Indeed, discussions and arguments favor the construction of knowledge (Harrer *et al*., 2008) and can be facilitated by the adoption of support tools that encourage group dynamics and group processes sometimes unreachable in the front-to-front training.

Collaborative activities of the project were conducted using the support environment developed in Second Life and presented in (De Lucia *et al*. 2009b).

The environment uses ad hoc developed Second Life objects which allow, through their integration with Moodle, to support the management of collaborative activities, including their articulation in topics of discussion, the management of the intervention reservations, the meeting set-up, the recording of the interventions and so on. An interface that allows to easily perform the actions required to participate in the meeting has been developed. The system provides role management. In particular, the supported roles are:

- The Organizer of the meeting, who is responsible for preparing the agenda and the support material useful to participants. The meeting agenda consists of a list of discussion points and to each of them can be associated an introducing speaker. In addition, the organizer, assigns a duration to each discussion point and/or each intervention.
- The Meeting Leader, who creates and maintains a social climate to lead the team to appropriate levels of cohesion. He/she provides and motivates significant objectives. The leader handles the communication scheduling the interventions in accordance with times, taking into account the list of the booked speakers. When somebody wishes to speak, the leader gives permission to do so following a reservation list.
- The Speaker, is the participant who is currently speaking after booking his/her intervention.
- The Minute taker, takes notes about the discussion, supported from a scribe object that logs on the Moodle all the chat messages written by the speaker. The length of the intervention is controlled by a specific timer.

This type of activity can be used to promote the leadership of components assigning to each team member the role of meeting leader and verifying which participant independently plays organizational functions.

3.1 Group Thinking: Einstein Exercise and code inspection

The selected task consisted in submitting to the group a problem to be solved. According to Senge (Smith, 2001) the intelligence quotient of a group (IQ) is greater than the IQ of an individual, if the group is cohesive and each participant uses each other as a facilitator to understand and resolve the problem. Sometimes, a situation of excitation pervades the meeting, the ideas seem to bounce from a participant to another. When this happens, the solution of the group is significantly better than the solution that each team member could individually provide.

The proposed activity consisted in deducting a property from a set of rules. The produced solution was the result of a collective debate, because each group had to provide a single result. One of the proposed tasks was a quiz from Einstein (Einstein, 2009), which stated that 98 % of the people cannot resolve it. It is the affirmation of a series of facts from which the solution of the problem must be inferred. The other tasks that were proposed were similarly difficult. All involved groups successfully concluded the assigned work in times comparable to those obtained in presence.

During the didactic activity, in addition to the quiz, a code inspection task was proposed as a static verification technique. Being based on the code examination, its execution is not required. The associated group activity consisted in asking the subjects to find errors in a set of C programs, with different levels of difficulty. The same activity was also conducted in presence during a controlled experiment and the subjects performances were almost comparable to the distance mode.

3.2 Pair Programming

Agile methods for software systems development were illustrated during the collaborative work-package, with particular reference to the eXtreme Programming (XP) (Beck, 2000), a software development methodology that focuses on collaboration and teamwork. Managers, customers and developers are equal parts of the collaborative team.

Extreme Programming implements a simple, but effective environment that enables teams to become highly productive and respond to requirement changes and technology requests. Extreme Programming uses a programming practice known as “Pair Programming”, a collaborative programming modality characterized by people working in couple using a single computer, side by side, during software design, implementation and testing. It is more and more diffused in industries and it is a promising practice. Participants in the synchronous lessons had acquired, in addition to these concepts, contents concerning incremental change, change propagation and impact analysis. In addition, the Second Life scripting programming language was presented.

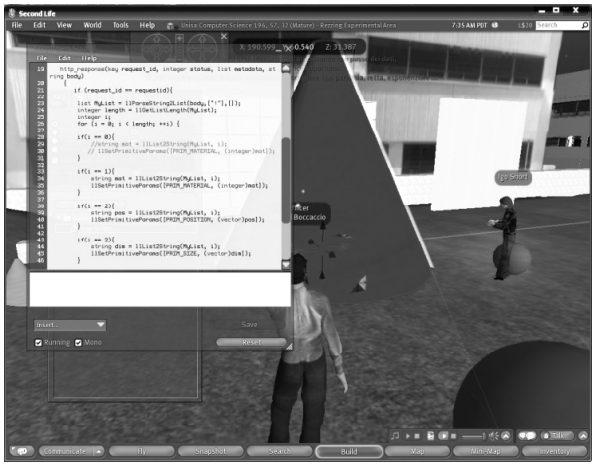

Fig. 2: A Second Life pair programming experience

Participants experienced two pair programming activities organized as follows: they were divided into pairs with different roles: one acted as a driver, writing the code, the other as an observer, revising the code and helping the driver to take decisions. To obtain a more complete learning experience, the participant roles were rotated during the activity. The selected task consisted in creating Second Life objects with an active behavior and with a growing difficulty. A tutor was available to couples for tips on the adopted programming language and to see if the guidelines proposed by the programming methodology were followed in an appropriate way.

4 Evaluation

The proposal of Second Life, and in particular of SecondDMI, to host the distance educational activities was substantiated by widespread similar trials within academic and industrial organizations, as well as by the results of controlled experiments. The assessment of the system is presented in detail in (De Lucia *et al*., 2009a and 2009b) and in (Abbattista *et al*., 2009). With targeted questionnaires we have measured the environment qualities perceived by users such as the presence and the sense of immersion and involvement, while a measure of objective performances has been derived by comparing the team task performances of the code inspection and of the logical quiz phases both in Second Life than in front to front settings. It is important to note that, according to the experiment design "paired comparison design", proposed by Wohlin (Wohlin *et al*., 2000), in all experiments players try, in alternating order, both

modalities subject to the comparison.

The support to the cooperation is evaluated in (De Lucia *et al*., 2009a and 2009b) where the system proposed for the meeting is compared with presence meetings. Although performance indexes are obviously influenced by the communication immediacy only achievable in presence, the perceptions of users and their performances have both resulted comparable and have not provided statistical evidence of difference.

TABLE 1
Pair Programming (PP) Assesment Questionnaire

1	The instructions and information regarding the PP received were clear
2	I experienced programming in Second Life freely and without insecurities
3	Following the actions of my PP partner was easy
4	Carrying out my tasks during the PP phase was easy
5	I think the programming language used is simple
6	I think similar environments can allow PP experiences in other languages
7	The PP experience has been productive

In (Abbattista *et al*., 2009) the study is enriched with an experiment aiming at comparing the Second Life environment with one specifically created for meetings, based on textual chat. The experiment purpose was to understand if a 3D environment introduces distraction elements, not strictly required, compared to a specific instrument. In this case, users' impressions have been positive and have not given statistical evidence that a three-dimensional environment is less productive than a specific one based on written textual chat communication.

The experience described in this article included an evaluation in which a questionnaire was proposed to users aiming at confirming the effectiveness of the environment in hosting a distance lecture and in supporting communication-based collaboration (Einstein Exercise and similar logical problems), and to evaluate the experience of remote pair programming. The results obtained in the assessment of the first two elements confirm those tabled in (De Lucia *et al*., 2009a and 2009b) and in (Abbattista *et al*., 2009).

Particularly interesting and positive was the impression of users on the experience of pair programming that is evaluated thanks to the questions reported in Table 1.

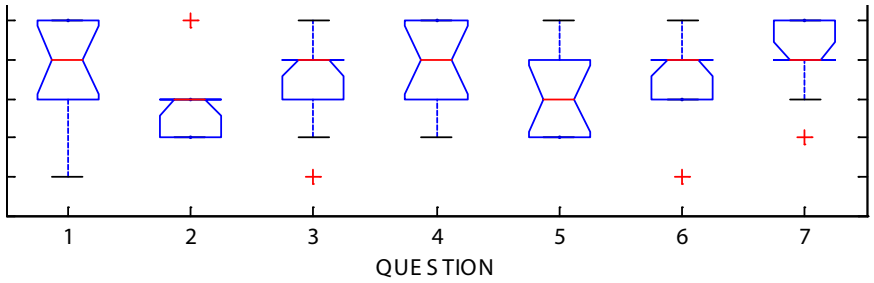

Fig. 3: Pair programming experience assessment

Although the values obtained, shown in the box-plots of Figure 3, denote decidedly positive impressions reported using the Likert scale (from 1, nothing to 5, very much), the lowest score values obtained from 2 and 5 questions are due to the novelty of the environment and of the programming language used for the experience. The environment has however been considered productive (question 7) and effective to the distance cooperation required from pair programming (questions 3 and 4). By examining the results to question 7, a widespread sense of confidence in technology is perceivable, when it is applied to other programming languages.

Conclusion

This paper reports a technology transfer experience provided the ICT companies focused on methodologies and technologies supporting collaborative work. A final questionnaire was submitted to the participants who were satisfied with their performance and found it very stimulating working in group. There is a big part of the subject sample that see as positive the adoption of the proposed methodologies in their work and Second Life environment or similar instruments useful for cooperation at distance. Distance pair programming made work more enjoyable compared to their traditional way of working: users were able to carry out the assigned tasks benefiting from the opportunity to socialize.

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