Chapter 68
Training Infrastructure to Participate in Real Life Institutions: Learning through Virtual Worlds

Pablo Almajano
University of Barcelona, Spain

Anna Puig
University of Barcelona, Spain

Maite Lopez-Sanchez
University of Barcelona, Spain

Maria Salamó Llorente
University of Barcelona, Spain

Inmaculada Rodriguez
University of Barcelona, Spain

Mireia Ribera
University of Barcelona, Spain

ABSTRACT

This chapter presents an example of a virtual training scenario that allows trainees to learn the rules of real human institutions before joining them, that is, before having to cope with the consequences of their binding actions in real (serious) settings. The development of the training scenario is based on a combination of Electronic Institutions technology with 3D Virtual Worlds, and is enhanced with tutoring agents that provide assistance services along the training process. The theoretical benefits that result from this approach are demonstrated through an authentic scenario that represents a market (i.e., an institution) devoted to trading water rights. This scenario has been tested with real users, and thus, its benefits have been empirically assessed.

INTRODUCTION

A real-life institution is a rather complex and structured environment where users participate with the aim of developing serious activities, such as the trading of goods. Therein, users interact by following well-defined communication protocols and playing different roles: staff roles are in charge of support-

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ing specific institutional tasks (i.e. register goods to trade or auction the registered goods), and external roles enter the institution to perform such tasks. Nevertheless, in these complex real-world scenarios, users may not know how to achieve their goals. Furthermore, users' actions usually have non-reversible and important consequences, such as, for example, the acquisition of legal obligations.

An approach to address users' participation in these intricate scenarios is to first immerse them in a "virtual" institution that reproduces the "real" one so that they can be trained to participate in the "real" one and to get familiar with its structure and functioning. Then, before their involvement in the "real" institution, users may learn by experiencing in a simulated environment, and this training would allow them to perform effectively and with confidence in the real situation.

In this context of adult learning, Kolb (Kolb, 1983, 2014) proposed a model that defines 4 experiential learning stages: concrete experience, reflection, abstract conceptualisation and active experimentation. That is, the learner lives a concrete experience, followed by a reflection on that experience. Then, the abstract conceptualisation allows either the application of known theories to the lived experience or the derivation of rules describing it. Finally, in the active experimentation the learner constructs a way of modifying the next occurrence of the experience, leading to a better performance.

These learning stages are usually leaded by the instructor and are experienced by the learner either inside or outside the class. On the one hand, typical in-person classes rely on the instructor to ensure the learner gathers and understands the needed information to reflect about, so that she is capable of creating an abstract conceptualization and to apply the gained understanding to the next experience. On the other hand, online (virtual) classes rely on a User Interface (UI) with the learner as the medium to go through the learning stages, with the timely support of teachers and workmates. This UI can be a web-based e-learning system such as moodle, or a 3D computer-generated simulation of an environment where the learner lives the "entire" learning experience. For example, a 3D Virtual World includes spaces for learning, tools to manipulate, virtual tutors to talk with, and other learners to interact with.

Some UIs consist in e-learning platforms, such as Moodle, where the last stage, active experimentation, occurs outside the e-learning space, that is in the learners' "real life"; whereas 3D Virtual Worlds (3D VWs) offer the possibility to do the active experimentation in the e-learning environment as well. Additionally to tutors and other learners, common to many e-learning spaces, 3D VWs offer spaces for learning, tools to manipulate, and virtual tutors. Moreover, virtual worlds grant the possibility to make an activity more than once at no cost and no risk, and they also result more attractive and ideal for social and collaborative activities.

Based on these benefits of 3D interfaces, this research sees 3D VWs as an adequate mean to instantiate this experiential learning cycle. That is, users can learn to participate in a real structured (complex) activity by acting themselves in a simulated scenario, experiencing the consequences of their actions, testing procedures and checking their understanding without harm (Hew & Cheung, 2010) nor consequences in the real world. As previous researches stated, virtual worlds could be much more appealing and engaging than traditional learning (Wrzesien & Alcañiz, 2010; Craven, 2015) . Hence, this chapter proposes to train real institutions' users by letting them experience their assigned duties within a 3D simulated space, fostering collaboration and engagement, and facilitating users' spatial situatedness and interactions.

Specifically, we present a Hybrid Structured 3D Virtual Environment where participants (both human users and software agents) develop, and are trained to develop, serious activities in rather complex institutions. To do so, we combine (i) an Organisation-Centred Multi-Agent System (OCMAS), to model the institution and regulate participants' interactions and (ii) a 3D training virtual environment, to facilitate learners interactions and engage them in the system.