Chapter 37
Virtual Worlds in Geoscience Education:
Learning Strategies and Learning 3D Environments

Annalisa Boniello
University of Camerino, Italy

Eleonora Paris
University of Camerino, Italy

Flavia Santoianni
University of Naples Federico II, Italy

ABSTRACT

Describes studies and research on geoscience education in virtual worlds. A correlation between spatial reasoning skills and professional performance in many scientific fields has been demonstrated. Traditional models of education are linked by the ideas that the relationship between teacher and students is asymmetric; the teacher transmits information and the students receive it; With the Web 2.0, traditional models of education should have been passed in favor of post-cognitivist models, where knowledge is distributed, situated and embodied. In this framework of interpretation, learning is no more a task-oriented process and knowledge is no longer transmitted but shared, co-constructed, and negotiated within a learning community. Likewise, Web 2.0 learning approaches allow users to interact and collaborate with each other in a social media dialogue as creators of user-generated content in a virtual community, in contrast to previous websites where people were limited to passive viewing of content.

INTRODUCTION

The chapter is an introduction to use of virtual learning environments in education in general and in particular the use of virtual worlds in geoscience education. In the chapter the background of studies on this topic and experiences on education and geoscience education in virtual worlds are described.

DOI: 10.4018/978-1-5225-8179-6.ch037

LEARNING STRATEGIES AND LEARNING 3D ENVIRONMENTS IN VIRTUAL WORLDS

Teaching Earth Sciences at School

In recent years, teaching Earth sciences is becoming more difficult in Italy, and a challenge for teachers, due to a decrease of interest among high school students (Venturini, 2009). This lack of interest reflected also in a diminished number of students' enrollment in the Geosciences courses at University, putting even at risk the diffusion of geologists in the society.

On the other hand, Italy is probably the country in Europe where the population is at highest danger for the risks connected to the geological nature of the territory: volcanic, seismic, hydraulic and hydrogeological hazards are heavily present, in fact, in all the Italian territory. Other than the general understanding of the natural environment, the lack of knowledge of the territorial geology creates a widespread disregard of the dangers connected with building in unsuitable areas, or deforesting the hillsides, or lacking attention and maintenance of the river beds or marine coasts. Therefore, too often a geologically–relevant event, i.e. a naturally occurring phenomenon, becomes easily a catastrophic event, due to the missing care of the territory or ignorance of the general rules of respect and protection of the environment.

As a result, the population, as well as the civil and industrial settlements and even the cultural heritage, are often stroke by geological phenomena, producing often enormous economic damages and even life losses, which could be mitigated or even prevented if a widespread geological knowledge was present and the awareness of the idea of the Earth as a dynamic system could be recognized and accepted.

This lack of understanding by the population on the way the Earth works, is certainly related to the lack of knowledge and interest to the Earth sciences, as learnt in school, for many different reasons. For example, the vast majority of the science teachers possess a Biology degree, which in spite of their professional capability, certainly does not help them in feeling confident about Earth sciences teaching, making them uneasy in dealing with in-depth information and activities (Lancellotti et al., 2016). This can produce, therefore, a lack of enthusiasm for the discipline, in both teachers and students. Moreover, the traditional transmissive teaching method, too often the only used in Italian education, fails in addressing topics related to a discipline which requires laboratory and field-based activity to explain the phenomena but also to attract the attention and the passion of the students (Occhipinti, 2016), which often arises only when outdoor observations make theoretical information come to life under the students' eyes (Stroppa et al., 2016; Pelfini et al, 2016). This is obviously true for every discipline, but becomes determinant for Earth sciences also for the generalized lack of equipped laboratories suitable for teaching geosciences in school (Berlinguer, 2008), as well as for the field activities highly needed but jeopardized by the teachers difficulties in finding help to overcome the personal lack of confidence in the topics.

School is, however, still the place where children and young adults can acquire basic information about the natural environment, its phenomena, and the need to better understand its characteristics to protect it and stay safe in the emergencies. In this regard, science teachers should assume the role of educators at 360 degrees, coupling the knowledge of the single disciplines but also giving the necessary interdisciplinary tools to approach the study of the environments from different points of view and with an integrated approach (European Commission, 2007). This is not an easy task, especially in a world were scientific knowledge and information run fast, often making textbooks rapidly obsolete and teaching methods not effective in stimulating enough the new students' generation.