Chapter 45
Multimedia Technologies in Education

Lucio Tommaso De Paolis
University of Salento, Italy

Egidijus Vaškevičius
Vytautas Magnus University, Lithuania

Aušra Vidugirienė
Vytautas Magnus University, Lithuania

ABSTRACT

As different means of information visualization become more popular and available both as commercial or open source products, there is an opportunity to use them in the education process by providing students with a larger variety of tools for mastering the required information and skills related to a learning object. The chapter discusses the use of various multimedia tools and edutainment (any entertaining application that has an educational role) in education and e-learning. The need and opportunities of applying 3D models, virtual and augmented reality, and certain means for controlling interactive learning environments are described in detail. Examples of 3D modeling, virtual, and augmented reality applications in history, arts, and medicine (surgery) education are provided.

INTRODUCTION

Every person perceives the surrounding environment as a 3D space. When one looks at a 2D object drawn/projected on the paper or other surface, he/she has to reconstruct the drawing to a 3D space in one's mind. This chapter intends to present and investigate different means for information visualization, capable of engaging students and making certain learning objects easier to master.

Several studies show that 3D models and virtual environments in e-learning context can significantly increase the engagement in learning and the understanding of learning objects (Horne et al., 2007; Perera et al., 2010; Souza-Concilio et al., 2013), and needed skills (Zaretsky, 2013).

Edutainment, a neologism created from the combination of the words education and entertainment, refers to any form of entertainment aimed at an educational role. Thus, it enhances the learning

environment and makes it much more engaging and fun-filled.

Virtual Reality (VR) technology helps to create applications for edutainment purposes and to integrate different learning approaches. The developing technologies of video games are driven by strong and increasing requests, but they are mostly restricted to the entertainment context - there are very few attempts to use these technologies for learning. A videogame is one of the most exciting and immediate edutainment tools since a game enables multisensory and immersive user relationship through its interactive interface; moreover, the cyberspace of a videogame is a socializing perspective for players.

One of the most interesting edutainment applications is the reconstruction of 3D environments aimed at helping the students to learn and explore ancient cultures and places that no longer exist or might be either too dangerous or too expensive to visit. In addition, it enables the interaction in a novel and very efficient way with the virtual environment that is considered as a shared social space where participants can act as members of a virtual society. By recreating or simulating an environment or an object of an ancient culture, virtual applications serve as a bridge between people of the ancient culture and modern users.

The "simulation" concept is closely linked to learning. The potential of simulation is more and more frequently used for supporting the teaching process. The technological progress enables the inclusion of immersive environments in educational contexts (in museums and schools).

Recreational aspects of a game, together with the realistic reconstruction of the scenario components, influence learning, which according to David Jonassen (1994) can be active, constructive, collaborative, intentional, conversational, contextualized and reflexive at a time (Varisco, 1999). When playing a game, students carry out didactic activities, being responsible for exploration, research and interaction with the objects on the screen, establishing a synergy between the

physical and the digital environments, actively participating, and being aware of reaching certain goals. On-screen activities reflect the behavior and the actions of a real world of the past (via the reconstruction of local details of the territory as it was in the past). The involvement of the users in sharing and exploring a virtual environment is the stimulus for the development of the "culture of participation". This new type of culture requires the development of new abilities with the contribution of contemporary communication scenarios and digital environments (Jenkins, 2010).

Educational agencies should, therefore, have the goal of providing opportunities and tools for developing new media literacy – "a set of cultural competencies and social skills that young people need in the new media landscape" (Jenkins et al., 2006, p. 4). For this purpose, Henry Jenkins uses the concept of simulation as one of the necessary skills to experience (in a critical and informed manner) the media landscape. He actually defines simulation as "the ability to interpret and construct dynamic models of real world processes" (Jenkins et al., 2006, p. 4).

In line with games and performance, simulation enables experimenting with problem-solving in a protected environment. Using the scaffolding method, it adopts alternative identities to discover or experience unusual situations.

The pedagogical aspect of knowledge (closely related to the simulation potential) is developed "in action," in a circular, interactive and collaborative way, according to a dynamic process consisting of experience stages, theoretical analysis, critical reflection and application. The model introduced by Mary Kalantzis and Bill Cope (2005) defines the analysis of relationships between the reality phenomena and application of new knowledge through empirical experience and theoretical investigation.

The didactic process outlined by the "Learning by Design" model envisages four different modes of acquiring knowledge (Yelland et al.,

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