Chapter 21

Interactive Models Based on Virtual Reality Technology Used in Civil Engineering Education

Alcínia Zita Sampaio
University of Lisbon, Portugal

Pedro Gameiro Henriques
University of Lisbon, Portugal

Carlos Oliveira Cruz
University of Lisbon, Portugal

Octávio Peres Martins
University of Lisbon, Portugal

ABSTRACT

Concerning the educational task, a school of engineering can be reasonably expected to constantly update computational resources which are in frequent use in the professions, technology which must be introduced into the training of the student, leading to their adaptation for curricula in these disciplines. The interaction allowed by three-dimensional geometric models could make an end to passive attitudes of learners as an opposition to traditional teaching systems. In addition, virtual reality technology could be applied as a complement to three-dimensional modeling, leading to a better communication between the various stakeholders in the process, whether in training, in education or in professional practice. Techniques of virtual reality were applied on the development of teaching models related to the construction activity. The involvement of virtual reality techniques in the development of educational applications brings new perspectives to the teaching of subjects related to the field of Civil Engineering activity.

INTRODUCTION

Since its development and initiation, information and communication technologies (ICT) has changed every facet of human existence and established itself as a part of the social and economic enterprises, as well as in entertainment, education, culture, etc. The educational sector has recognized these potentials and incorporated networks and multimedia as important tools for enhancement and upgrade of learning process. At present times, the educational process includes many ICT based methods for teaching and learning. So, the relevance of the use of ICT in education is quite evident nowadays. In particular, the use of ICT in teacher training has been considerably analyzed, especially in relation to learn how to use ICT as a teaching tool. Exposing teachers in training to the technologies and experiences that will be important to their professional future can contribute to the development of a range of indispensable abilities for their teaching activities which are not available in a model of traditional training. It is a fact that advanced computer and information network technology has revolutionized our teaching and learning approaches and methods and this also changes the learning environment. Thus, by means of the use of the technologies teachers were able to integrate different aspects that are novel in relation to traditional education, like the change and renovation in the didactic process, besides the use of new recourses, educational infrastructures and practices. Furthermore the ICT suppose a modification in the strategies and methodologies that harness the continuous learning of student, and have become an important instrument of support in the educational innovation in the last years, allowing the personalization of the learning process, centering now more in the learning of the student.

In fact, communication technology provides a mean to connect people and to share information and expertise, enabling the growth of both individual and collective knowledge and skills. Educational institutions can use it to access information, as a form of collaboration and communication with teachers, as a tool for conveying educational contents, and as a mean of online teaching. To use this technology there are details that must be addressed, namely specific instructional resources and a framework that facilitates both the different interactions (teacher-learner, learner-learner and learner-content) and the inherent comprehension (Gomes & Caldeira, 2004). A communication platform allows participates to exchange information about specific domains, interact and learn in a cooperative way and it encourages the continuous sharing of materials, plans, problem solving, presentations and continuous reflection on the different dimensions of team network. So an aspect that must be improved is preparing didactical materials to support the teaching activity in an ICT platform.

Concerning the educational task, the interaction allowed by three-dimensional geometric models (3D) could make an end to passive attitudes of learners as an opposition to traditional teaching systems. In addition, virtual reality technology (VR) could be applied as a complement to 3D modeling, leading to a better communication between the various stakeholders in the process, whether in training, in education or in professional practice. This task is particularly relevant to the presentation of processes which are defined through sequential stages as generally is the case in the learning of new curricular subjects.

Besides this constant updating of training in the new graphic resources available to engineering/architecture professions, and in widespread and frequent use, the school should also adapt its teaching activities to the new tools of visual communication. In fact, several software engineering is used today in practical discipline, which requires that future engineers have the competencies and knowledge to develop economical and feasible solutions. Undergraduate students must be educated and trained to perform the roles required for software development in order to create effective

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