

Chapter 18

Methods for Assessing 3D Virtual Worlds in Design Education

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ABSTRACT

With the advancement and increasing adoption of information and communication technologies, 3D virtual worlds, being a part of these revolutionary forces, have the potential to make a major contribution to design education as a new teaching and learning environment. Considering this changing trend, we have been employing 3D virtual worlds in the design curriculum over the past decade. To critically understand the impact of the technologies on design education, this chapter explores and demonstrates three different assessment methods of 3D virtual worlds in design education, through three case studies. The chapter also concludes with insights into the applications of virtual environments in collaborative design teaching.

INTRODUCTION

This paper is motivated by the challenge and opportunities of new emerging educational paradigms of using Collaborative Virtual Environments (CVEs) into design education and presents three formal methods we have adopted for assessing CVEs - 3D virtual worlds in particular - in design education. We reasoned that a deeper understanding of the effects of 3D virtual worlds on students' learn-

ing processes would provide a perspective from which a more suitable approach could be adopted to better support students' educational experience. Each assessment method will be illustrated and demonstrated through the case studies. The paper will be concluded with a brief discussion on the effectiveness of the three methods based on the case studies. These methods can be adopted accordingly by other educators and researchers to formally assess their practices. Through the

DOI: 10.4018/978-1-4666-8614-4.ch018

analysis of the assessment, we may also see the degree of the importance of the 3D virtual world in developing the students' creativity in different educational programs.

BACKGROUND

Design is widely recognized as a type of problem-solving that consists of problem formulation, solution generation and process strategies (Dorst and Dijkhuis 1995; Cross and Dorst 1999). The central concern of design education is to develop students' capabilities for understanding and solving design problems through appropriate educational courses (Chan and Cheung 2001; Clemons 2006; Gürel and Potthoff 2006). Student designers need to be trained to develop their design abilities, and this focus has the potential to provide a cognitive shift because it can provide new frames of reference that restructure problems in such a way that the creative process is enhanced. Collaborative Virtual Environments (CVEs) have the potential to enable innovative and effective teaching which involves, for example, collaboration, debate, simulation, role-playing, discussion groups, brainstorming, and project-based group work. Socio-cultural theories of learning may be integrated in teaching in CVEs. The affordances of CVEs as constructive learning platforms centre around providing a shared "place" where distant design collaboration, synchronous and asynchronous communications and design activities take place (Gül et al. 2008). Creative design is closely associated with the concept of restructuring, which reflects a change in the designer's perception of a problem situation (Ohlsson, 1984). The affordances of CVEs provide the availability and possibility of new ways of designing (Gül et al., 2008), allowing significant time-space independence for learners and teachers (Hara, Bonk, & Angeli, 2000), and facilitating learning activity focused on the production and the use of shared content (Yang, 2007). It is important that teach-

ers have an understanding of students' potential. This understanding helps teachers to facilitate a learning environment to foster the development of the students' creative ability.

In design education, 3D virtual worlds have formed new design platforms for collaborative design learning as students can now collectively develop and document design ideas when they are in remote locations. 3D virtual worlds are multi-user online environments developed by applying the metaphor of 'place', and have the potential to make a major contribution to design education as instances of new teaching and learning environments which support synchronised communication and 3D modelling. 3D virtual worlds are also new learning platforms which encourage students to explore creative design by responding to the new design contexts and opportunities exhibited in these virtual environments. While teaching in 3D virtual worlds, the students need to obtain design knowledge, which typically forms the construction of buildings and places and issues such as layout design, navigation design and virtual object design (Gül et al. 2007). The most popular interactive online games and the emergent agent-based intelligent worlds, for example, have been leading the fields of interaction and experience design. Once mediated with software agents 3D virtual worlds become intelligent and responsive to their inhabitants (Gül et al., 2007). In fact, 3D virtual worlds create places that users experience just as they are immersed into a virtual world (Bolter & Gromala, 2003).

The feel of immersion and the achievement of a sense of presence in virtual environments are the challenging problems today. The concept of interactivity is complex and multi-dimensional, but in this context an interactive medium is one in which the user can influence the form and/or content of the mediated presentation or experience (Steuer, 1995). The degree to which a medium can be said to be interactive depends on a number of subsidiary variables: the number of inputs (Biocca, 1995; Sallnäs, 2002); the number (and

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