Chapter 18
Methods for Assessing 3D Virtual Worlds in Design Education

Leman Figen Gül
TOBB University of Economics and Technology, Turkey

Ning Gu
The University of Newcastle, Australia

Mi Jeong Kim
Kyung Hee University, Korea

Xiangyu Wang
Curtin University, Australia

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’ learning 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
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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 solv-
ing design problems through appropriate educa-
tional courses (Chan and Cheung 2001; Clemons
2006; Gürel and Potthoff 2006). Student designers
need to be trained to develop their design abili-
ties, 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. Col-
laborative Virtual Environments (CVEs) have
the potential to enable innovative and effective
teaching which involves, for example, collabora-
tion, 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 asynchro-
nous 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 percep-
tion 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 indepen-
dence 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 environ-
ments 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 in-
telligent 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 num-
ber of subsidiary variables: the number of inputs
(Biocca, 1995; Sallnäs, 2002); the number (and