Chapter 9

Constructivist Learning Theory in Virtual Design Studios

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ABSTRACT

In the authors’ design teaching, they have been employing virtual world technologies, allowing students the capacity to collaborate and design within a constructivist immersive design platform such as Second Life (www.secondlife.com) and Active Worlds (www.activeworlds.com). These environments support synchronous design communication and real-time 3D modelling. Particularly, 3D immersive design environments have the potential to make a major contribution to design education as constructivist learning environments. Based on authors’ teaching experience and the students’ learning experience, this chapter discusses 3D virtual world as constructivist learning environments that support team-based design and communication skill-building and presents the challenges faced by design education today. The chapter firstly provides a critical analysis of various design learning and teaching features offered in 3D virtual worlds as constructivist learning environments, secondly, identifies a number of key issues in addressing engagement and interaction in virtual design learning, thirdly, addresses the core skills and cognitive processes of designing in 3D virtual worlds, and finally, provides several strategies for the facilitation of virtual worlds as the constructivist design teaching platform.

1. INTRODUCTION

Recently the developments in and extensive use of internet technologies have brought about fundamental changes in the way designers practice and collaborate. This has led to the transformation of their organizations through implementation of higher levels of IT-based strategies. In response to these changing trends in design practice, design schools have been using these advanced information and communication technologies in design curricula. Design education is concerned with teaching theory and applications in the design
of artefacts that could occupy human activities. Historically, schools of architecture taught “descriptive geometry” (Lee and Reekie 1949), based on an Euclidean understanding of form and space. The revolution of the paper making technology in the fifteenth century can be considered as the “application” that enabled “the intellectualization of buildings”, leading the notion of architecture as we know it today (Kvan et al. 2004). Innovative approaches to design education should consider the impact of computer technologies on creating “new ways of designing” (Kvan et al. 2004) and integrating digital skills (craft) and design thinking (art) (Kvan et al. 2004; Gül et al. 2007).

In relation to this view, 3D virtual worlds offer many opportunities for design teaching and learning, the most known of which is the support for constructivist learning. There are approaches which integrate the emerging fields of digital design into design education, such as employing parametric design, interaction design, experiential design, graphic design, product design, etc. Although these studies use new technologies in design education, there is still a general lack of research and practice which explores the potential of design teaching in 3D virtual worlds as constructivist learning environments. Perkins (1991) classified constructivist paraphernalia including information banks, symbol pads, construction kits and task managers. According to Perkins, computational tools facilitate human memory and intelligence to interpret experience and to refine mental models. Thus computer-supported constructivist learning environments focus on how representations and applications can mediate interactions among learners and natural or social phenomena (Dede 1995).

2. A CONSTRUCTIVIST VIEW OF DESIGN LEARNING

2.1 Introduction to Constructivist Learning

A constructivist view of learning focuses on the process of knowledge construction with concept development achieving a comprehensive understanding of the goals (Resnick 1986; Fosnot 1996). Constructivism is characterized by an approach where individuals construct their own understanding and knowledge of the world, through confronting new experiences and reflecting on those experiences (Huitt 2003; Mahoney 2004). According to the constructivist view, the learning process involves the following two concepts:

1. Knowledge is obtained and understanding is expanded through active (re)constructions of mental frameworks (Piaget through Bransford et al. 2000; Abbott and Ryan 1999), and the learner’s previous knowledge constructions, beliefs and attitudes are considered in the knowledge construction process (Murphy 1997); and

2. Learning is an active process involving deliberate progressive construction and deepening of meaning (Spady 2001). Learning situations, environments, skills, content and tasks are relevant, realistic, authentic and represent the natural complexities of the ‘real world’ (Murphy 1997).

In contrast to behaviourism which centres on students’ efforts to accumulate knowledge of the world and on teacher’s effort to transmit it, in the constructivist view of learning, teachers play the roles of coordinators or facilitators. A subtle difference between behaviourism and constructivism is that behaviourism emphasizes observable and external behaviours, constructivism takes a more cognitive approach, has profound implications for all aspects of a theory of learning (Murphy 1997).
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