Chapter 12
Learning Language through Immersive Story Telling in a 3D Virtual Environment

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ABSTRACT
This chapter reports on the development and application of Kingdoms, a 3D virtual environment used for the learning of Chinese language at elementary level. The Kingdoms was developed based on Vygotsky’s constructivist learning theory, game-based learning principles, and a specific instructional technique called the Enter-the-Story method. The Kingdoms leverages the representational fidelity and learner interaction of the 3D virtual environment, which is rich in Chinese cultural artifacts, to create an immersive and engaging environment for students to learn the Chinese language. The empirical evidence from an exploratory case study shows encouraging results that are indicative of the potential of 3D immersive worlds for language learning.

INTRODUCTION
The last decade has seen a phenomenal increase in research and development activities related to the educational applications of immersive 3D virtual environments (de Freitas, 2008). This is partly driven by the fact that youth today are attracted to the game-like feeling of playing in a realistic immersive environment impregnated with attractive graphics and opportunities to socially interact with others. This active exploration into the applications of immersive worlds for educational purposes is best demonstrated by the exponential increase in educational activities...
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in Second Life, a virtual world that has attracted more than 16 million account registrations since its inception in 2003. For example, the Virtual World Watch project (Kirriemuir, 2009) reported numerous UK universities—including Open University, Edinburgh and Coventry—that use virtual worlds as their preferred technology for a wide range of teaching and learning activities. Even government agencies like the United States Air Force (Richeson, 2008) have a presence in Second Life to enhance general public education. Proprietary virtual environments developed for specific learning objectives are also reported, as seen in projects like Quest Atlantis (Barab, Dodge, Thomas, Jackson, & Tuzun, 2007) and River City (Dieterle & Clarke, 2009). Language learning is one of the emerging educational applications in 3D virtual environments. Professional language learning organizations like EUROCALL and CALICO support language learning through the use of Second Life, as do some universities (e.g., Monash) and prominent language institutes (e.g., British Council).

Given that the application of 3D immersive environments for language learning is still in its infancy, there is a paucity of empirical research in this area and the need for discussion on the theoretical underpinnings of these applications. This chapter reports our effort in the development and application of a 3D virtual environment, called the Kingdoms, for learning Chinese language at elementary level. This chapter begins with an examination of the affordances of 3D immersive environments for language learning and a review of relevant research studies in this area. Next, Vygotskian social constructivist perspectives of language learning is discussed, followed by a description of an instructional technique called the Enter-the-Story method (Wenger, 2004) that we used to design a 3D immersive world for learning of the Chinese language. Finally, empirical evidence from an exploratory case study is reported.

AFFORDANCES OF 3D VIRTUAL ENVIRONMENTS FOR LANGUAGE LEARNING

There are two main characteristics of 3D virtual environments (Dalgarno & Lee, 2010) that provide users with the sense of immersiveness (Driver & Driver, 2009): representational fidelity and learner interaction. Representational fidelity is achieved through realistic graphical representations of environments and objects that appear 3D to human perception, smooth object motion and view changes, and the use of avatars to represent users. Learner interaction could be achieved through view control, navigation and object manipulation, scripted objects that respond to human actions, and verbal or non-verbal communication with other users. Sense of immersiveness is a continuum (Driver & Driver, 2009) rather than an experience that can simply be dichotomized as a presence or absence; it is also dependent on the degree of engagement with the senses of the users, and the meaningfulness and desirability of the activities to the users. Thus, immersive experience is created when users respond to the visual, tactile, or auditory stimuli and when users participate in activities that require collaboration or interactivity with objects or people. Although advancement in technologies has made possible additional features like realistic 3D audio that simulates spatial depth or the use of haptic technology to provide kinesthetic and tactile feedback (e.g., CAVE project by Cruz-Neira, Sandin, & DeFanti, 1993), we do not consider these features to be necessarily defining characteristics of 3D virtual environments.

The graphical fidelity of 3D virtual environments and the use of avatars also encourage the learners to stop thinking of the objects in the environments as an extension of themselves, but as a tokenization of the learners (Bartle, 2004), so as to create a sense of being there. In Bartle’s (2004) words, “You are not role-playing a being; you are