

Chapter 24

Towards Usable Collaborative Virtual Reality Environments for Promoting Listening Comprehension

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ABSTRACT

This chapter investigates whether an educational virtual environment can be developed to practice listening comprehension skills that meets second language student needs, complies with usability criteria, and is motivating to use. The chapter also investigates whether the usability of virtual reality (VR) technology positively affects language learning listening comprehension. It provides background research and information in Computer Assisted Language Learning (CALL), VR, and second language methodology. It then presents a technical and qualitative description of Realtown, a virtual environment designed to promote listening comprehension. This chapter also describes a usability study of Realtown. Student errors, motivation, and ease of use, among other features, were positively measured on listening comprehension activities in Realtown. Future work includes longitudinal studies on learning issues, first-person, and collaborative experiences in VR, including the impact of VR on learning and knowledge transfer when combined with traditional instruction.

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INTRODUCTION

Technology has been used to teach the four language skills (reading, writing, listening comprehension and speaking), and listening comprehension has sometimes represented the most difficult skill in which to achieve competence. Although CD-ROM/DVD-ROM-based technology and multimedia software provide comprehensible input, the relationship of sound and visuals in their video materials do not parallel the real world given the lack of user interaction (Bush & Terry, 1997, p. 95).

Consequently, the use of virtual reality technology for providing listening comprehension practice presents students an environment in which they can interact actively within a computer interface where they can, in fact, “perform actions” represented by an avatar, interacting with the interface using various sensory channels. Performing actions in response to commands forms the basis of the James Asher’s Total Physical Response Method (Asher, 1977).

Although virtual reality (VR) was first introduced in the 1960s, it became more widely used in educational settings in the 1990s, where most of the research and development was in the areas of chemistry and medicine (Youngblut, 1998). For example, Park, Yoon, Kim, Lee and Han (2007) presents a virtual simulation system for a total knee replacement. Their system is based on mechanical computer-aided design (CAD) software and implemented using basic CAD functionality such as shape modeling, assembly, automation, etc., allowing surgeons to determine important surgical parameters prior to the operation itself. Ting, Lin, Chen, Lee and Chang (2003) describe a virtual reality system for unicompartmental knee replacement surgery training using a typical PC-based system and low-cost, six-degrees of freedom (motion) and three-degrees of freedom (force/resistive) manual manipulator. They model both the soft and skeletal tissue of the knee (based on computerized tomography scans) in addition

to an assortment of surgical tools. Using the manual manipulator, trainees are able to interact with the model, performing the surgical steps comprising the unicompartmental knee replacement procedure.

The application of VR to second language instruction has been a much more recent development. One of the most important investigations is the Zengo Sayu Project (Rose & Billinghamurst, 1996), which is an immersive educational environment for learning Japanese. The Zengo Sayu Project examined whether students could learn spoken Japanese using the Zengo Sayu VR system, how the System compared to traditional instruction in terms of learning gain, and whether the Zengo Sayu approach had a positive effect on student motivation and attitudes towards learning Japanese. However, conclusions from the study are inconclusive.

Recently, Internet-based 3D social networking environments such as Linden Labs’ Second Life (SL) have been used for second language learning. SL is an online virtual world where millions of Internet users have been registered to primarily socialize, but they can also contribute to SL by developing and uploading graphical objects, buildings, etc. and thus customize the environment. Its users can interact as virtual personifications called avatars, and users can communicate with each other using gestures, text messages, and their voice using voice over IP (VoIP). SL can be accessed via the following URL: <http://secondlife.com>. In general, SL graphics and many of its features can be personalized. The ability to personalize the SL environment is considered a fun and compelling feature. There are two versions of SL, one for adults and one for users between 13 to 17 years of age, called Teen Second Life. The SL virtual environment, often referred to as the “metaverse” contains many “islands” (also called “sims”) that can be purchased and owned for a fee from Linden Lab or from other SL residents. Once purchased, the user can opt for using his/her island for their desired purposes. SL applica-

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