# Chapter 37
# Avatars in E- and U-Learning

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## ABSTRACT

*Avatars are virtual agents or characters that graphically represent users within virtual environments. Avatars can be implemented in three-dimensional (3-D) virtual environments for training purposes. While there are promising findings indicating that avatars can enhance the learning experience, conclusive and generalized evaluations cannot be made at this time. The effectiveness of these virtual agents in a learning context remains an open question. The purpose of this chapter is to present background information on the definitions and use of avatars in e-based, virtual learning environments and to address the applicability of avatars to ubiquitous learning (u-learning). This chapter examines the available empirical research on the effectiveness of avatars in facilitating social interactivity, motivation, and collaborative learning in 3-D environments. Finally, this chapter provides suggestions for future studies on the design of avatars in both e- and u-learning.*

## INTRODUCTION

### Background Information

The term "avatar" has entered into common usage in both the popular vernacular and in professional circles due to the increasing popularity of mass multi-user online role-playing games (MMOR-PGs) such as World of Warcraft and online virtual environments such as Second Life in the late 90s and early 2000s. With conservative estimates placing the number of MMORPG users at over 14 million, the private sector has started to recog-nize the potential of virtual online environments in streamlining many business procedures. Following IBM's venture into Second Life in 2007, companies such as Wells Fargo, Accenture, and BP have created virtual meeting spaces for training, product demonstrations, and awareness-raising events. The U.S. Naval Undersea Warfare Center (NUWC) employs avatars in multiple virtual world environments to facilitate training and work teams. In addition, many universities and colleges now have virtual campuses. It is predicted that just under one billion users worldwide will have an avatar within a 3-D virtual environment by

2017. As a result, the use of avatars has become a topic of discussion among learning professionals (Chou, 2009; Gartner Group, 2007; Gutl, Chang, Kopeinik, &Williams, 2009; Korolov, 2009; Lemon & Kelly, 2009; Second Life Education, 2010; Shein, 2010; StrategyAnalytics, 2008; Takahaski, 2010; Twining, 2009; Vasileiou & Paraskeva, 2010; Wyld, 2010).

For the purposes of this chapter, an avatar is defined as a user-created digital representation whose appearance and behavior resembles that of a human (Yee, Bailenson, & Ducheneaut, 2009) and who represents the learner's presence in a multi-user virtual environment (MUVE) (Bailenson, Swinth, Hoyt, Dimov, & Blascovich, 2005). In general publications, the term avatar, within the context of learning, is sometimes loosely defined as a visual representation of a learning agent within a MUVE (Hew & Cheung, 2008; Salmon, 2009). The learning agent could be either a real person or a computer application. This definition would include the sub-classification of embodied agents, or computer-controlled representations providing help, assistance, and instruction in MUVEs. The two, however, are fundamentally different in principle; therefore, avatars will be, in this paper, classified as distinct from embodied agents.

Though avatars and embodied agents are both integral components of interactive virtual environments, their operating mechanisms are fundamentally different. A person or user controls the former while a computer program uses the latter as a conduit to convey information to the user (Bailenson, Merget, Schroeder, & Yee, 2006; Vasileiou & Paraskeva, 2010). Currently, in a MUVE or a "metaverse" (Davis, Murphy, Owens, Khazanchi, & Zigurs, 2009, p. 91), learners can create an avatar that allows them to interact with other avatars or even embodied agents within the environment (Lemon & Kelly, 2009; Jones, Morales, & Knezek, 2005; Warburton, 2009).

While immersive environments with avatars have proven popular outside the business world, their acceptance within the business community has been limited (ASTD, 2010). Erica Driver, of the ThinkBalm analyst firm, notes that avatars and virtual worlds are in the early adopter (Rodgers, 2003) stage as an enterprise tool (Shein, 2010). Beyond Second Life, there are enterprise virtual worlds such as ProtoSphere, OLIVE, Open Simulator, 3-D Wonderland, Active Worlds, and vPresence (Rosen, 2010). The use of avatars in 3-D virtual worlds still has a way to go before being fully accepted for training or learning purposes. There are several reasons: lack of management buy-in, cost, insufficient technological infrastructure, a video game image, a trend towards mobile devices, and questions about effectiveness. Moreover, the response among colleges and universities has also been hesitant (Davis et al., 2009; Bessiere, Ellis, & Kellogg, 2009; Young, 2010).

## RESEARCH PROCESS

In order to provide a detailed examination of the available research, the researchers employed the research method of an integrative literature review. The utilization of embodied agents and avatars in e-learning dates back slightly more than a decade, and much of the early research, beginning in the late 1990s, focused on embodied agents. Since the technology for rendering realistic-appearing avatars was not available to the research community until the middle of this past decade, empirical research on avatars is limited (Bailenson, Merget, Schroeder, & Yee, 2006). An integrated review would bring together the existing literature, analyze it for common themes, and synthesize them into a new understanding of this topic as well as provide suggestions for future investigation (Torraco, 2005). According to Cooper (1982),

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