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Utilization of Second Life as a Tool for Spatial Learning in Interior Architecture

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Abstract

With increase in computer usage, three-dimensional (3D) virtual environments (VEs) have become new areas for navigation and spatial learning. Second Life (SL) has become one of the most popular 3D VEs that is used as a learning environment. This study focuses on the issue of spatial learning during virtual navigation in a multi-level desktop VE designed in SL. The usability of SL as a tool for spatial learning in interior architectural design is investigated by analyzing virtual navigation paths, gender differences and sense of presence. The study is conducted with 90 interior architecture students studying at Bilkent University, Ankara, Turkey. Results indicated that SL can be an effective tool for individuals to learn an environment and for interior architects to improve their designs by learning from the navigation behaviors of the users.

Keywords: Virtual environments; second life; navigation; spatial learning

1. Introduction

Architectural design is the science and art of building that generally encompasses a broad diversity of tasks such as conceptualization, organization and construction of the built environment. It is a problem solving activity that requires experiencing the spatial layout of a building, discovering and learning spatial information, and maintaining spatial orientation during navigation. Lifelong learning is a must in our society with changing spatial environments and user needs. While developing the spatial organization of an environment during the initial phase of the design process, interior architects need to determine the nature of the way finding problems that future users will encounter during navigation (Passini, 1996). With the emergence of three-dimensional (3D) virtual environments (VEs), interior architects are able to obtain an immersed view of the proposed building, assess and improve their designs by learning from the navigation behaviors of the users. This study focuses on the issue of spatial learning during virtual

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navigation in a multi-level desktop VE designed in SL and investigates the usability of SL as a tool for spatial learning in interior architecture.

2. Virtual Environments (VEs)

In recent years, virtual environments (VEs) or computer-simulated environments have been applied to various fields. They have become a tool for spatial knowledge acquisition since they offer the opportunity of controlling and manipulating the characteristics of a real world environment. They allow simulated exploration of 3D environments from a view-centered perspective, allow the creation of environments with different levels of complexity, allow the researcher to have greater control over both visual features and complexities of the environment than the real world environments and allow interactive navigation with continuous measurements within it (Belingard & Peruch, 2000). Behavior of the individuals within the environment can be recorded and assessed separately. In the scope of lifelong learning, Kirschen, Kahana, Sekuler, and Burack (2000) indicated that VEs are used effectively in tests of spatial learning. Spatial knowledge acquired through learning the VEs can be effectively transferred to subsequent navigation in real world environments (Lessels & Ruddle, 2005). A VE for architectural use allows interior architects and clients to obtain an immersed view of a proposed building by allowing the user to move through it. It enables the individual to visualize and interact with the virtual 3D proposed spatial environment in real time (Çubukcu & Nasar, 2005).

2.1. Navigation

Navigation is a core functional requirement that individuals perform in VEs (Santos et al., 2009). It is a spatial activity that is guided by visual information of the environment (Zhang, 2008). Bell and Saucier (2004) stated that navigation is "a complex spatial problem that is routinely faced and solved by humans and other animals" (p. 252). Navigation can take place in familiar environments or in novel environments in which an individual has little or no prior experience; it can also occur in large environments that are difficult to perceive from a single point. In order to navigate successfully the individuals need to plan their movements using spatial knowledge gained about the environment and stored as a mental map (Santos et al., 2009). In the theory of interior architectural design, the idea of navigation is emphasized as a central theme. In order to understand a building's interior structure and spatial organization, one needs to make his/her way through the building. Hölscher, Meilinger, Vrachliotis, Brösamle, and Knuaff (2005) stated that we do not experience the spatial layout of the building as a static structure but perceive it as a result of navigation; we discover architectural information step by step.

2.2. Second Life

Second Life (SL) is one of the most popular 3D VEs that is used for educational, social and business purposes (De Lucia, Francese, Passero, & Tortora, 2009). Especially, educators have begun to explore the potentials of SL as a learning environment. It is a rich environment that allows students, instructors and professionals to actively create learning experiences through the creation of specific environments (Coffman & Klinger, 2007). SL enables its users to experience objects/buildings in 3D through rich viewpoints and introduces a new opportunity for interior design development and education. SL encourages building through a simple but powerful building tool that does not require exclusive skills and that offers real-time realistic renderings through lighting and texturing effects (O'Coill & Doughty, 2004; Weber, Rufer-Bach, & Platel, 2007).

SL is elaborated by the participation of its users in which they are able to interact in the environment with an avatar. The avatar, which is the visual representation of the user, is manipulated with a keyboard and a mouse. SL enables real-time interactions and that offers its users the possibility to build virtual spaces and objects, and to personify their avatars through a user-friendly interface (Hendaoui, Limayem, & Thompson, 2008). Users are able to navigate by walking, flying and teleporting between spaces; other movement types such as jumping and running are also available. Users are able to view the 3D environment through the avatar, i.e. first-person viewpoint, or over