

## Chapter 3

# Reviewing the Effectiveness and Learning Outcomes of a 3D Virtual Museum: A Pilot Study

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### ABSTRACT

*This comparative descriptive mixed methods pilot study reports results of a joint research pilot study between the University of North Texas (UNT) and the Autonomous University of the State of Mexico (UAEM). Data was collected and analyzed for effectiveness, usability, and knowledge acquisition in the Leopoldo Flores Museum located in Mexico, and its online 3dimensional replica. The primary results of this research show a) students using the virtual environment first and then visiting the museum exhibited better knowledge acquisition about the museum and had higher level of discourse when on the guided tour, and b) the virtual museum experience, when used alone, was a comparable experience to the actual museum guided tour in both knowledge gained and satisfaction.*

### INTRODUCTION

From the moment humans are born, we are continuously acquiring knowledge and discerning the world through our senses. Children learn to communicate with sounds and gestures, to walk and to talk, and later, they learn to perform more difficult tasks such as riding a bike or writing and reading. Throughout their lives, people will develop skills and will learn to interact with others in a variety of situations. This continuous learning process is generated by a myriad of motivators: the desire to communicate with others, read a book or ride faster, or the interest to gain a new skill or get a better job.

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Human motivation to learn is tied to benefits from that learning. Motivation can be extrinsic and tied to usefulness (for example completing a certification for a pay raise), or intrinsic, which arises from within the individual, and can be tied to enjoyment (Deci, Koestner, & Ryan, 1999; Isen & Reeve, 2005; Ryan & Deci, 2000.) Researchers have defined individuals who are intrinsic oriented as having “learning goals” and those who have extrinsic motivators as having “performance goals” (Csikszentmihalyi & Hermanson, 1995; Brophy, 2005; Seijts & Latham, 2005). As Dweck (2000) defined them, “performance goals are about winning positive judgements of your competence and avoiding negative ones” and “learning goals are ones that reflect a desire to learn new skills, master new tasks, or understand new things...” (p. 72)

Every year millions of people visit museums around the world. Only in America, 850 million of visitors attend exhibitions around the country each year (American Association of Museums, 2008). The majority of visitors go to the museums during vacation time, and the main activity inside them is to take pictures and see the artifacts. Some people like to read the information or rent the audio guides, some others buy a book about the museum to get more information. Some attend with their families and friends, others go alone. All these activities and decisions to attend museums are intrinsically motivated and are tied to curiosity and interest (Csikszentmihalyi & Hermanson, 1995). In addition, almost all the schools around the globe organize several visits to the museums so students can learn about the information these places offer. Unfortunately, some people cannot, or do not want to visit those institutions for a variety of reasons (Hood, 2004); thus, museums have been exploring the use of multi-user virtual environments (MUVEs) for more than a decade, often in the form of proprietary, non-persistent virtual worlds designed and developed for select audiences such as teachers and students (Urban, Marty, & Twidale, 2007).

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### **THREE-DIMENSIONAL ENVIRONMENTS FOR LEARNING AND VIRTUAL MUSEUMS**

In the decade of the 1950s, Morton Heilig invented the Sensorama, a simulator designed to provide the illusion of reality (Rheingold, 1991). Since then, several other tools such as multi-user virtual environments (MUVEs) have been developed and used in the corporate, entertainment, and educational arena to simulate real world experiences. MUVEs, sometimes also called virtual worlds, provide users with perceptual stimuli in a simulated ecosystem, where digital representations of oneself interact with others in a dynamic community (Bell, 2008).

As MUVEs continue to evolve, the realistic quality of graphics and the amount of people available for interaction, make these tools the perfect setting to engage users in scientific inquiry, conduct research on teaching and learning, and use visual methodologies to recreate representations of otherwise impossible to reproduce real life situations, such as the eruption of a volcano, or trips to an ancient civilizations.

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