

# Chapter 36

## Virtual Reality Using Smart- Devices in Educational Frameworks: Case Study – Museum Casa Batlló

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### ABSTRACT

*The main aim of this study is to improve the understanding of historical buildings through the use of advanced visual technologies. The main innovative features of the project are focused on the use of mobile and wearable technologies, the indoor location, and their mixed assessment an educational project. We will use smartphones, virtual reality and indoor positioning systems. Both the devices and the users' experience will be assessed with a quantitative and a qualitative approach. The proposal seeks to complement, the real experience of visiting an emblematic space (our case study: the Casa Batlló Museum, 1904-1906, Antonio Gaudí, Barcelona, Spain), in order to improve the spatial skills of architecture students and general visitors of this type of architectural landmarks.*

DOI: 10.4018/978-1-7998-1757-4.ch036

## **1. INTRODUCTION**

Nowadays, the ways we communicate, consult the news, watch television or simply play have changed in order to adapt to new devices and applications, which include characteristics such as mobility, interaction and interconnection. Cultural activities have been a clear example of this revolution; with many interactive screens, multimedia shows and a great variety of performances based on the use of ICTs (Information Communication Technologies). In this regard, and as we will see, it is still easy to find examples of researches and projects aimed at the development and implementation of ICTs in cultural places, in order to improve the visitors' experience (Grinter, Aoki, Szymanski, Thornton, Woodruff, & Hurst, 2002; Haugstvedt, & Krogstie, 2012).

Any proposal that enhances the spatial understanding of a cultural space does not only have a social utility, but also an educative utility (Sharples, Lonsdale, Meek, Rudman & Vavoula, 2007). One of the inherent objectives of Architecture and Technical Architecture studies aims at the presentation and understanding of architectural space through all kinds of infographic techniques. Often, infographic proposals of singular spaces can be classified into two categories: those placed in a real space (museums, or expositive places), (Chang, 2006), or inside a virtual zone (such as digital environments accessible via mobile devices), (Sundar, Go, Kim, & Zhang, 2015). Both proposals link the visitor's position to the art pieces and cultural heritage sites, giving access to additional information and content (Burigat & Chittaro, 2007).

The motivation behind this article appears with the necessity to evaluate, in an educational context, the way in which architectural space is presented in an interactive form. With this method, students are able to evaluate, not only the configured explanation, but also the implemented working method and to what extent it can be applied to the presentation of their future projects with the current available resources: models, static panels, infographic videos, etc. Casa Batlló Museum (1904-1906, Antonio Gaudí, Barcelona, Spain) was selected after achieving several requirements: it is located in the same city as the faculty (facilitating the transport and visit for the students); it is provided with a multimedia video-guide with 3D contents that explain the singular space; the system locates the user position (using beacons) and his/her position related with the POIs (Points Of Interest) in order to show the virtual content about the constructive process and the house itself into the mobile devices; it is a World Heritage Place; and we have been provided with free access for those architecture students who collaborate in the project.

The main aim of this experiment is to study student-mobile interaction in the position-based process of visualizing virtual reality (VR) data. Our primary objective is to assess the method's usability (indoor location based contents), and our secondary objective is to validate the hypothesis that the use of these methods improves students' understanding of architectural spaces (based on the explanations of architectural elements that students can watch and listen in the virtual video-guide).

In order to analyze the proposed educational method and assess the degree of usability of the system, we adopted a mixed approach. The quantitative approach is based on ISO 9241-11, previously used in other educational cases, (Fonseca, Martí, Redondo, Navarro & Sánchez, 2014, Pérez-Cota, Thomaschewski, Schreep & Gonçalves, 2014), which provides usability assessment guidelines of efficiency and user satisfaction. The qualitative approach is a post-visit interview with a representative sample of the students involved in the project, who will share their experience with the appliance of this new technology into the visit. For this final stage, Bipolar Laddering Assessment (BLA) was used, a technique also previously validated in other educational experiments (Fonseca, Redondo & Villagrasa, 2015; Fonseca, Valls, Redondo & Villagrasa, 2016).

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