

Chapter 22

Teaching Archaeology in VR: An Academic Perspective

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ABSTRACT

The authors discuss their experience at Duke University and, more specifically, at the Dig@Lab, a core research unit of the CMAC (Computational Media Art and Culture) program in the Department of Art, Art History, and Visual Studies. This community of scholars and students represents a new branch of experimental teaching in digital humanities with the participation of students and faculty from the humanities, engineering, computer science, neuroscience, and visual media. In particular, the Dig@Lab studies the impact of virtual reality in cyberarchaeology and virtual museums.

INTRODUCTION

After a long period of development and disillusion over the potential of virtual reality, a new digital era is opening tangible and relevant perspectives for research and education. This is due to the large-scale use of low-cost devices (VR headsets, Oculus, HTC, Google VR, and the like) and digital games. Goldman Sachs (Equity Research, January 13, 2016) predicted in January 2016 that virtual reality will overhaul TV by 2025 with a potential market of \$ 0.7 billion. We saw more recently an extraordinary technological improvement in the virtual reality headset market, particularly for games and VR applications. Portability, technological standardization, low costs, and ergonomics determined the success of these devices.

The game industry and social media boosted the market of VR in different directions, but what about research and education? How did Universities and research institutions act in this last decade of applications in 3D visualization?

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Art, Art History and Visual Studies. This community of scholars and students represents a new branch of experimental teaching in digital humanities with the participation of students and faculty from the humanities, engineering, computer science, neuroscience, and visual media. In particular, the Dig@Lab studies the impact of virtual reality in cyberarchaeology (Forte 2010, 2015) and virtual museums. This research work started in 2013 with the development of immersive applications for the DiVE (Duke Immersive Virtual Environment, fig. 1), installed in 2006 and discontinued in 2018. The DiVE was one of the first fourth 6-sided CAVE-like systems in the United States. It was a 3 by 3 by 3 m stereoscopic rear projected room with head and hand tracking and real time computer graphics. All six surfaces—the four walls, the ceiling, and the floor—were used as screens onto which computer graphics is displayed. The lab implemented several archaeological projects for the DiVE: “Virtual Digging Project at Çatalhöyük” (2014-16; Forte 2010, 2014)¹, “the Villa of Livia” (2012-13), “Akrotiri” (2015). All of them were designed for a collaborative experience since the DiVE could host up to seven users simultaneously. In fact, we designed a series of virtual classes for this environment, giving the students specific tasks to accomplish in the 3D space (Appelbaum *et al.* 2017). One of the biggest issues we faced in the DiVE was the lack of a routine use for research and teaching. Every project in three-dimension had to be specifically redesigned for this environment and all the models rescaled for this purpose. Also, it was a limited collaborative space, given the constraints of the space and the lack of reciprocal interaction among the users.

The new generation of portable systems (such as Oculus, HTC headsets and the like) completely replaced the old VR devices and virtual reality started to be a mass phenomenon.

Several academic institutions started to introduce VR and gaming technologies in their curriculum and in research projects in the humanities but very randomly and without specific strategies. In the United States, some classes are hosted in visual studies, design, computer science, anthropology, architecture and in digital humanities more in general. At Duke University we introduced interdisciplinary undergraduate classes on gaming, Unity 3D, digital archaeology, virtual museums, digital heritage, and 3D visualization. Every class has a lab component and the students are committed to deliver articulated digital projects at the end of the semester. The rapid acceleration of didactic activities in virtual reality, in particular in the digital humanities, paved the way to more advanced forms of learning, but with several question marks about this digital impact and communication. Are multitasking and 3D environments able to release a greater amount of information? Can we learn quickly and more efficiently in virtual reality? What kind of metrics shall we apply for the evaluation of this digital approach? In short, what is/will be the impact of VR technologies in human learning? All these questions should consider that each level and kind of interaction involves different body engagements and the output of sensory information depends on this. Haptic and kinesthetic are the most used for research and teaching tests (Hamza-Lup and Stanescu 2010); in our case we designed a digital archaeological exhibit based on this approach (see paragraph below).

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