DIGGING THE VIRTUAL PAST

Panagiota Polymeropoulou
Technological Educational Institute of Western Greece, Greece

ABSTRACT

In this paper we will investigate the way that the technological progress and the Informatics contributed greatly to the field of Archaeology. There will be analyzed the terms of virtual archaeology and virtual reality in archaeology and there will be an extended reference to the applications and the computer graphics that archaeologists could use for their own scientific purposes. It will be attempted to be shown the way that computer graphics can create not only an authentic copy of an archaeological find but can function also as a useful tool of learning for new archaeologists and the broader public that is interested in the ancient past.

KEYWORDS

Technology VR, virtual archaeology, simulation, virtual environment, learning outcomes

1. INTRODUCTION

In the field of culture the new technologies offered new potentials of management and presentation of the cultural heritage and redefined the role of the cultural organisms and institutions that deal with the documentation, the preservation and the promotion of the cultural asset. The archaeologists used the new technology, the computer graphics, in order to visualize the archaeological data in a way, easy to understand, not only for themselves but also for the public that was interested in the archaeological finds. The “virtual reality in archaeology” or the “virtual archaeology” as it was named, could open new ways in the scientific community concerning the research and the presentation of the ancient remains. It created various applications of simulation, depiction and representation not only of the excavated finds but also of the modus vivendi of the ancient civilizations. The images that were created for the reproduction of the ancient past or the monuments, constituted a subject of skepticism concerning the authenticity of the archaeological information included in these images. The effort to represent the ancient past with the new technology poses new, controversial problems over the documentation and the credibility, arising new issues and speculations (Molyneux, 1997:1). This paper presents the created virtual environments based in archaeological data that can constitute a new, contemporary and potential learning environment developed for future professionals in archaeology. The new virtual environment can be used also for learners of all ages as a new method of informal education in cultural organizations and spaces such as in the museum.

2. THE 3D REPRESENTATION

The 3D graphics consist one of the major achievements in the field of Informatics. In order to be created the contents of a “scene” or for the synthesis of a three- dimensional representation, there are followed methods of calculations that derive from the exact sciences like mathematics and geometry for the rendering of the texture (texturing), the illumination of a 3D scene or in the case of motion (animation). From their presence and then, the 3D graphics have seen a rapid development, even in an artwork’s display (Polymeropoulou, 2010). With the new technology, many sciences wanted to use the 3D graphics in order to visualize objects, ideas or situations that so far it was impossible to be represented. This technical and hypothetical element that forms the imitation of the real created the meaning of “virtual”.

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2.1 What is Virtual or “Qu’est que le virtuel”?

The new trend of visualizing elements, data or ideas had a broad effect answering not only recreational purposes but as well as scientific and educational. The exact meaning of the word “virtual/ virtuel” is defined as the potential, something that can exist but at the same time is not real. The word derives from the Latin virtuelis>virtus which means power, force. The philosopher Gilles Deleuze uses the word “virtual” so to describe something that every object carries with it that is not its reality, nor only that it could be but rather what it is supposed to be. The “virtual” is used to indicate a possible situation that it could be substantial (Deleuze, 1968). According to the French philosopher, the virtual reality is understood as the possible reality with two reverse meanings of the real. Since, from one hand the VR consists of a simulation of the natural environment, on the other hand whoever simulation from her nature simulates a real object or fact, the experience of a possible reality that depends on the visual effects of the computer, creates a environment with double character. And here is the oxymoron: The environment of virtual reality is real meaning it exists and is operative, but on the other hand is not real since it is a simulation of the reality (Levy, 1999:26). Due to the fact that the word “virtual reality” and “virtual” puzzled many philosophers and researchers, many prefer other terms for the rendering of the word. So they rather talk about “compound experience” (Sánchez et al., 2001; Beroggi et al., 1995; Loomis,1993) or “compound environment” (Durlach & Mavor,1995; Jayaramb et al.,1997), “simulation technology” (Psotka,1995), “artificial reality” (Biocca & Levy,1995) or just “cyberspace” (Hayles,2001). Nevertheless, the word “virtual reality” has been prevailed almost generally.

2.1.1 The Virtual Archaeological Environment

The introduction of the computer in the documentation, the depiction and the presentation of the archaeological data changed the archaeologists’ way of thinking, arising new urgent questions about the methodology of the research, the knowledge and the spread of the culture. The technological achievements, depending on the needs and the archaeological theories that come up in every time period, come to cover the needs of the archaeological and excavation survey and methodology. We observe the gradual transition from the simple observation through comparison and the data analysis to the visualization and the reconstruction or/and the simulation of the ancient pasts, by using the continuously evolving programming languages and the artificial intelligence. The 3D graphics were used especially for the simulation of a virtual archaeological dig. Since Archeology is a scientific field that is based on excavation and the field survey, the majority of the applications are focused on simulating the archaeological dig with realistic problems that an archaeologist may have to deal with (Fig.1). A virtual dig consist of an excellent instructive tool for the new, future archaeologists since the excavation is a destructive method (Polymeropoulou, 2014:45) without allowing for a margin of erroneous decisions and movements. The new archaeologist is placed virtually in the environment of the excavation and deals with challenges such as how to interpret the elements of the ancient human behavior that the soil reveals during the dig (Slator and Associates, 2006:71). For the best possible simulation of the virtual dig, the user – excavator should be in a virtual excavation field where the data are based on real excavation scenarios. Moreover, the faithful depiction of a dig offers multiple searching potentials to the archaeologist himself for the detailed analysis of the archaeological particulars.

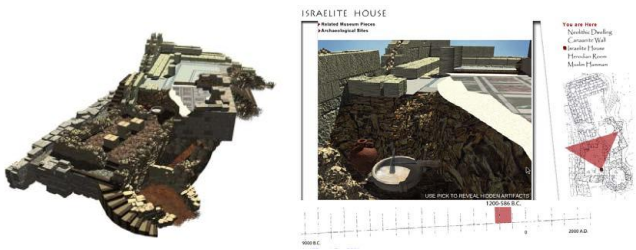

Figure1. Simulation of an archaeological dig (Dunn, 2002:122 – 23)

The technology VR permits the archaeologists to use a relevantly economical equipment so to accelerate the excavations and to preserve more analytical, accurate and accessible geometrical data of the archaeological finds and the location where there were found (Leymarie et al., 2000:3). In a virtual environment all the elements are comparative, dynamic and interrelated (Forte & Pescarin, 2006:4). The

archaeologist in a virtual learning environment is able to have access in virtual copies (models) that bear the same information as the authentic and can study/ process data with no restraints or without the fear of destructing an ancient object. Even more, he is given the opportunity with the virtual environment to return in it long time after and to re-examine his data, making new interpretations and assessments in order to strengthen or to refute his theories. As a result, the creation of realistic 3D models synthesizing a virtual environment, according to the data recorded in situ during the dig, is of major educational importance. In this virtual environment, the new archaeologist learns how to excavate, to study, to interpret and finally to understand the ancient past by optimizing his methods and techniques in the excavation field. Besides, the real dig is a non reversible procedure and every datum is of crucial importance so to fulfill the image of the distant past.

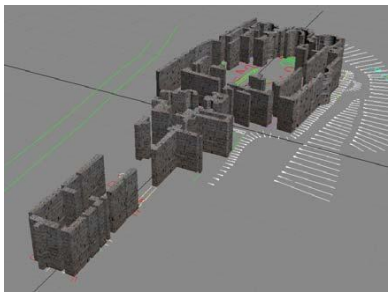

Figure 2. The case of virtual representation of the monument according to real archaeological data. The Laconia Acropolis Virtual Archaeology project (LAVA) (Getchell et al., 2006:6)

The archaeologists used the 3D graphics so to represent the ancient monuments (Fig.2). More specifically, they attempted, through the control of different hypothesis and conjectures, to experiment with the texture, the illumination, the location of observation or the form of the model (Godin, 2002). During the representation of the ancient monument the 3D graphics can depict the different phases of life of the monument and the procedure of its discovery. The scientists have been aided substantially in the field of conservation and restoration of finds, movable and non movable (Velios & Cummings, 2001:10) (Fig. 3).

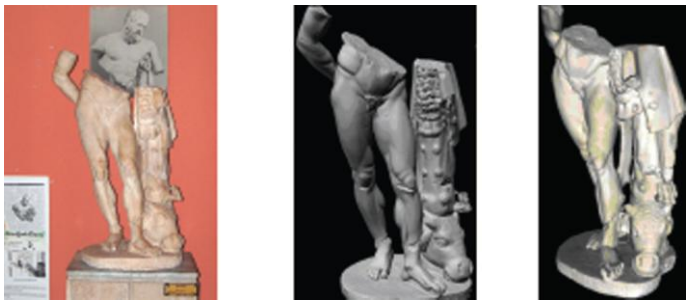

Figure 3. The case of the digital conservation of the so called statue of “harassed Hercules”. Modeling of the down half that stands in Attaleia Museum in Turkey and the completed up half in the Fine Arts Museum in Boston, USA.(Gruen, 2009:302)

During the digital conservation, the conservator has no longer direct contact with the object and the conservation can be done virtually. In this environment, the conservator can be educated since there are proposed different solutions for the conservation of a broken vase or the restoration of a monument and can calculate all the possible versions (Forte& Pescarin, 2006:4). The digital completion and the aesthetical restoration have a low cost. That means that the heavy, fragile and immovable objects can be easily and equally conserved as the small and light objects. In the field of visualization, the 3D graphics convert the created or selected data to visual representations. In a virtual environment the user can experience a completed integration of data and information. The new technology put on a small revolution on the way that the information could nowadays be stored, retrieved and presented.

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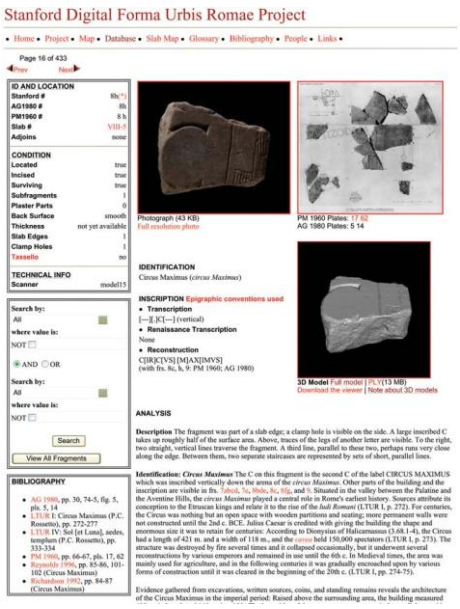

Figure 4. The internet data base of archaeological content. The example comes from the project "Stanford Digital Forma Urbis Romae Project" under the auspices of Sovraintendenza ai Beni Culturali del Comune of Rome. (Koller, 2008: 158)

The systematic storage of natural and chemical characteristics, descriptions of typology, historical information and cultural data for the objects of the cultural heritage leaded to the creation of cultural data bases (Fig.4). These cultural data bases contain information about the cultural assets, monuments and museums, that are open to the public via internet. The power and the multiple potentials of the internet in collaboration with the 3D technology resulted to the creation of virtual museums. The virtual museum in the website or the virtual environment in the museum, addressing to the museum visitors, differs towards the structure and the purpose of existence, from a system of virtual reality that is used by the scientists.

3. CONCLUSION

The applications of virtual archaeology are based on the narration of a simple, realistic and interactive system. The participant – visitor, immerses and gain an enjoyable experience while he learns through his participation in the application. On the contrary, the scientists rely on the complicated Data Bases that are constantly renewable and are used by the community. The aim of the scientists is to study and to research their data, following trustworthy methods and techniques. The purpose of the virtual environments is not to imitate the reality but rather to contribute in order to understand the reality (Barceló, 2001:231). As a result, the issue is not in what way virtual reality can become reality but rather how the virtual can enhance in a novice and alternative way the experience of reality (Gillings, 2002). Even though many objected and discredited to the meaning of the term "virtual archaeology", the need of a scientific integrity and credibility of the applications of virtual reality whether for a broader public or the scientific community, raised major issues of documentation and standardization. Towards this, the London Charter in 2006 enacted the purposes and the principles of using the methods of 3D visualization in regard to integrity, reliability, transparency, documentation, standards, sustainability and access. It becomes clear that in both professional, scientific applications and in those for the museum visitors, the virtual environment can be seen as a means that will help to bring home the knowledge. A part of this knowledge can be achieved if there will be presented the sources, the methods, archaeological and technical, that aided to the visualization (Ryan, 2001:245).

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