

FROM PRESENCE TO DISTANCE IN MUSEUM EDUCATION: THE USE OF AR- CHAEOLOGICAL FINDS TO CREATE DIGITAL ASSETS THROUGH 3D SCAN- NING

DALLA PRESENZA ALLA DISTANZA NELLA DIDATTICA MUSEALE: L'USO DEI REPERTI ARCHEOLOGICI PER CREARE ASSET DIGITALI ATTRAVERSO LA SCANSIONE 3D

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Abstract

In this work, some reflections regarding the educational videogame's development for museum education are reported. In particular, the importance of creating objects (digital assets) for 3D graphics engines starting from archaeological finds, a consequence of the importance of collaboration between museums and universities and to capitalize the distance education's experiences made during COVID-19.

In questo lavoro vengono riportate alcune riflessioni sullo sviluppo dei videogiochi educativi per la didattica museale. In particolare, l'importanza di creare oggetti (risorse digitali) per motori di grafica 3D a partire da reperti archeologici, conseguenza dell'importanza della collaborazione tra musei e università e di capitalizzare le esperienze di formazione a distanza realizzate durante il COVID-19.

Keywords

Museum education; archaeological finds; digital assets; 3D scanning.
Educazione museale; reperti archeologici; risorse digitali; Scansione 3D.

1 Michele Domenico Todino is the author of paragraph "Why establish these collaborations between archaeological museums and universities?"; Lucia Campitiello is the author of paragraph "Why use the 3D scanner in museum education?"; Stefano Di Tore is the author of paragraph "From archaeological finds to Digital Assets: technical details."

Why use the 3D scanner in museum education?

In the edugame will have the perception of being able to touch 3D objects embedded in a 3D engine (such as *Unity3D*), to be “gifted” to use them and better see them in a simulation that allows a gamer to travel back in time, by stimulating “another” world, where inventiveness and imagination are stimulated (Gee, 2013). Archaeological finds’ 3D scans, pieces of the historical real-world placed in a virtual environment, could bring people closer to the ancient civilizations. Their history and studies are incentivized through a playful and recreational approach. The 3D scanner model used at the LabH of the Department of Humanities, Philosophy and Education of the University of Salerno is *Shining 3D EinScan-SP* (Figure 1). This specific technology is ideal for: 1) Education, mainly for training on 3D design; 2) realize 3D object for primary, middle and high school (because scanned objects can be 3D printed); 3) historical reverse engineering (to understand the functioning of an ancient object through a blackbox-whitebox approach, manipulating it without breaking it, doing tests such as virtually immersing it in a fluid, doing a torsion tests, a dynamic or static structural tests in a 3D engine that applies real world physics; moreover in this virtual environment shooting an arrow, using a gladius, but also cooking in an old pot, cultivate plants with ancient techniques, etc.); 4) design and art application; 5) digital industry, such as animation and videogames developing; 6) last but not least, 3D digital archiving, data sharing. Thus, is easy to understand that all of these six points could be declined very well in archaeological fields and historical studies from a didactical point of view.

From archaeological finds to Digital Assets: technical details

A researcher is aided in their scanning activities because this device embedded widespread post-processing utilities tools. The main function is the 3d scan's filling holes one. More in details, after a 360° rotation, a raw 3D scan could be automatically smoothing and sharpening. This is very important for who have to convert many object from real to digital assets because convert real object to digital ones takes a lots of time. Although, it is not true that just with a few click the data are readjust, a researcher must spend time to coordinates in the post-processing procedure to provide a picture-perfect 3D data to be used in a virtual environment.



Figure 1. Replicas of archaeological finds used to test the 3D scanner at the labH of the University of Salerno (photo by the authors).

During the test scans, made in the LabH, the main difficulties were: 1) the right intensity of light in the room where the technology is placed; 2) the right size of the objects (even if the scanner has a tripod to scan large objects); 3) the use of double-sided tape to fix these objects to the scanner. These critical aspects made it possible to better understand how to proceed in a museum when a researcher goes to realize 3D scans. The process foresees that: 1) a room with the most adequate light is used in the museum (better if they do not reflect light, therefore opaque); 2) the objects must be selected with the right size; 3) the archaeological finds are precious and are part of the historical and cultural heritage, thus, they cannot be applied with double-sided tape, therefore the objects must stand alone on the rotating plate of the 3D scanner, without falling during rotation, in order not to break it.

Why establish these collaborations between archaeological museums and universities?

Universities could collaborate with museums in many fields: educational programs; developing educational technologies such as edugames; increase audiences; art restoration; works of art safety and conservation. Thus, each department of a university could collaborate in a specific way. However, for some museums the main problem remains the number of visitors and often a request for university collaboration is limited to economical researches, marketing, sales at book stores, ranking on search engines etc. By reason of what has been stated now, for Knudsen and Simonsen (2017), in their explanation of experiences from a large research program, about collaboration between universities and museums done in northern Europe, museums point their attention to increase audiences. Knudsen and Simonsen state that: “cultural policies, museums and university researchers have increasingly focused on how museums approach their audiences (those who visit museums) and the more general public” (Ivi, p. 89). Furthermore, this Danish research states that: “in this setting, museum-audience communication is widely seen as a central point for discussion and improvements within museum practices” (Ibidem). In this way, museums become places where make economic revenues, something like a source of income, taxes to safeguard culture. These institutions becoming economically autonomous systems; this is respectable but it is a starting point, not an endpoint. While the issue of having many visitors to the museum is an important one, it is worth remembering that museums are cultural institutions whose purpose is also to educate. The teaching-learning process is seen as a mere “relapse”, not as a main theme. Furthermore, this research carried out in 2017 does not take into account that the pandemic has made physical access to museums very difficult for a few months (and this may happen again) thus audience should also “virtual”. At the moment, it is more than ever necessary to be able to access pure resources in a computer-generated way remotely. Never as today, university education departments can offer their experience of distance education in order to offer museum itineraries aimed at promoting the knowledge that the museum can give to the visitor even from remote access to the work of art. This capitalization of the distance education’s experiences made during COVID-19 is also ICOM (International Council of Museums) lines; to be “adaptive to changes” (Economou et Alii, 2021). Indeed, ICOM highlights that “at times of crisis and transition such as this, [museums and universities should worked] together as an international community, sharing problems, ideas and new perspectives is both an aspect of chance and also a crucial element for understanding the potential for change. In 2020, [Each institution, either university or museum] had new opportunities to share our experiences of COVID-19 and its impact on our practices, our capacity to respond, survive and adapt. This 2021 joint conference is building on these experiences to explore broad lessons of adaptability and resilience” (Ivi, pp.5-6).

Being “adaptive to changes” and resilience is not new in teaching studies, especially in didactics (Sibilio, 2013, 2020), for years, didactic has been dealing with the importance of adaptation to change and how educational

practices must be carried out in changing circumstances. In this direction (being adaptive to vicissitudes that could be happened in Europe and in our World) also The Recovery and Resilience Plan: Next Generation Italia goes. This plan is a prodigious chance for Italian universities and museums as well. A possible way to act is to introduce distance learning best practices, emerged in these pandemic years in museums education, moreover, to start a vast campaign of digitization of archaeological finds finally to do virtual museums: a digital twin of physical ones to be explored online. In conclusion, it should be noted that this short paper did not expressly state about edugame, but about the creation of the objects that “populate” them. Educational video games made for museums must have very special characteristics. Mainly, that the objects present in them must be those of the collections kept physically in the museum. These games can then be made available on the museum's web-site or downloadable as applications for smartphones, tablets or PCs. For this reason this work has focused on the aspect related to the creation of digital replicas of archaeological finds using a 3D scanner that is the starting point for each museum edugame, and also it shows some important reasons to establish these collaborations between archaeological museums and universities.

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