Enticing Students of Humanities to Learn 3D Virtual Restoration Exploiting Engaging HCI Solutions

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ABSTRACT

As a matter of fact, based on our decennial teaching experience, students of humanities often see computer science-related matters as something far apart from their course and, ultimately, from their bent.

In this paper we report how we exploited HCI to entice students of humanities to take on computer science classes with a positive attitude.

CCS CONCEPTS

• **Human-centered computing** → **Scenario-based design**; **Empirical studies in interaction design**; • **Applied computing** → **Fine arts**;

KEYWORDS

Touchless gestural interaction, Interaction with 3D virtual objects, Learn by goals.

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1 BACKGROUND

Most of the current students of Bachelor's and Master's Degrees come from the "Generation Y" (also known as "Millennials"). It is thus supposed they have a very good knowledge of the "digital world", without fear about it.

Actually, they are only compulsive users of digital services, with absolutely no knowledge of the underlying software and hardware frameworks. They do not know anything, nor care, about bandwidth, fake URLs, IP addresses, a BCc recipient, local or remote resources, and so on [1]. For most of them, "Facebook" is the Internet itself. In other words, such "digital natives" of the 2000s are passive onlookers of the world that "digital immigrants" prepared for them in the eighties.

This is particularly true for students of non-scientific or technical degrees, such as Humanities and Law.

When we started our teaching experience within the Master's Degree in History of Arts, we felt such fear and aversion towards our Applied Computer Science class. We thus decided to face such negative feelings, and started a change process in our teaching subjects and method.

First, we tried to understand what were the underlying reasons for such aversion. Among others, we discovered that students of that Degree did not see how our concepts could be useful for them once on the job market. In other words, they did not see how useful could be an even basic knowledge of computer science for their future job in the field of History of Arts.

2 CONTRIBUTION

We then took the challenge up, and decided to propose and "advanced" subject of computer science applied to the history of art, with the final goal of the engaging fruition of cultural heritage by means of innovative ways of interaction. [2]

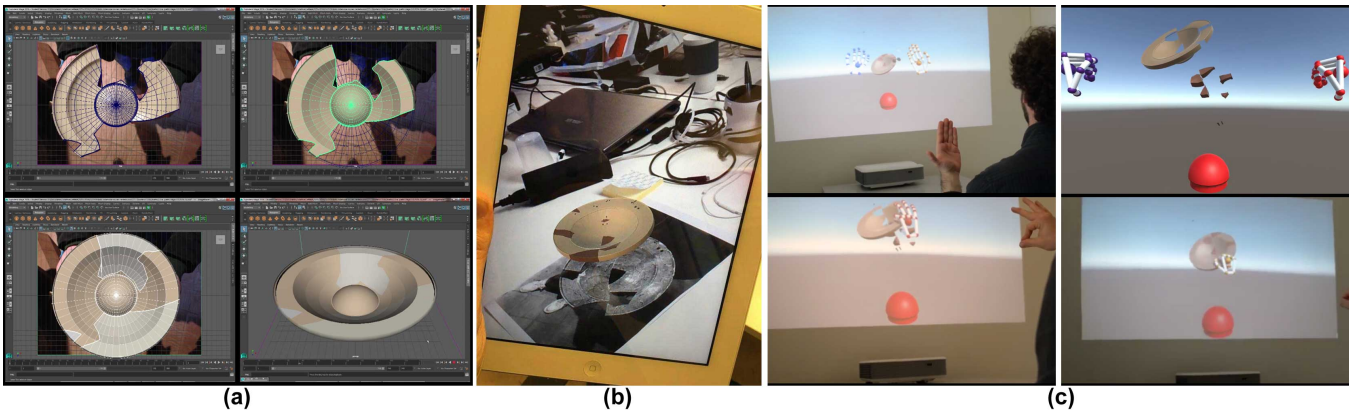

Figure 1: (a) modeling and restoration; (b) AR view of a restored artifact; (c) touchless manipulation of the artifact

In particular, we decided to show tools and processes leading to 3D virtual restorations of real artifacts, and how to put them within an engaging fruition system. Here is when HCI and our expertise in the field came in help, since we decided to set the things up in order to let prospected users interact with the 3D artifacts exploiting some of the most recent HCI solutions.

Students were asked to learn Autodesk Maya to model the current shape of an artifact starting from its front, side and top views used as reference images. Then, they were asked to imagine a possible restoration of missing parts, based on the available information, and to model it too (Fig. 1a).

In order to entice the students to learn how to virtually restore an artifact with such a complete (and complex) modeling and rendering tool, we show them a possible use case. In particular, we put the complete 3D objects in two interactive fruition systems. The first one can be accessed by mobile devices and allows its users to see the 3D artifact in "live" augmented reality (Fig. 1b). The second one is a virtual manipulation system, by which users can use their hands to grab, rotate, zoom, expand and shrink the artifact[1] (Fig. 1c).

3 LESSONS LEARNED

Our choice greatly motivated our students to deal with a complex and cross-field scenario, such as the virtual restoration of real artifacts with a 3D modeling software tool. After only 30 hours of front lessons, and starting from absolutely no knowledge of the tool, all our students (120 along 4 years) created their own restored masterpieces. We think that the key to our success is the perceived usefulness, due to:

(1) the tight link with actual situations and environments. Indeed, one of the main problems of museums and exhibits is that people can not touch nor manipulate the available artifacts, for safety and security reasons. A virtual fruition system to be accessed by moving the hands, allows people to "manipulate" the virtual objects as expected with actual artifacts, avoiding the related risks;
(2) the "easy" restoration process. 3D modeling softwares allow to reconstruct the artifacts with no risks. Different possible restorations are possible too, when there is no clear information about the original shape;
(3) the benefits for all players. People may be encouraged to visit sites and museums, both in person and virtually from their places. Scientists may make new discoveries by looking at how an artifact could have been in origin. Site managers may increase their incomings from the supposed higher number of visitors, by keeping low expenses and high levels of security at the same time.

We often see discussions on how to teach HCI in STEAM learning paths [3]. Here we somehow reversed the vision, and used the HCI as a lure to entice students of Humanities learn to use a multi-purpose 3D modeling tool. This way of exploiting HCI as *objective* instead of *object* can be particularly useful for non-technical or scientific courses. We can exploit an apparent flaw of "digital natives", enticing them learn even complex subjects targeting the available new exciting ways of interaction with computer systems.

[1] A demo video is available at https://youtu.be/Eyps_RWnqZY

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