



## Let's make fire! Experiences of 'hands-on' educational workshops for the dissemination of prehistory knowledge

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**ABSTRACT** - Make, touch, smell, identify, and collect the clues to piece together a story from the ancient past.

What works and what doesn't work, in the teaching of prehistory and human evolution? And how to adapt to an ever-changing audience? To answer these questions, scientists have devised a plethora of communication strategies, ranging from the 'simple' educational workshop to augmented reality technologies. Furthermore, it is not easy to touch the hominid and artifact replicas locked in the museum display cabinets. After carefully observing and accumulating opinions and experiences in schools, museums, public and private spaces, and after working with both children and adults, the empirical answer to the questions above is in the "hands-on" approach which allows to secure complex concepts through the activation of non-traditional cognitive processes.

Lighting a fire with stones or sticks, painting with ocher and bird feathers, trying to chip or to 'butcher', and touching the skull of someone who lived in a very remote time, are just a few of the activities that can be proposed and that open new horizon and allow the non-specialist user to identify with them by putting into practice the "hands-on" approach.

Finally, the 'games', the investigations built on stories that take their cues from the most up-to-date scientific news and that allow you to simulate, albeit in an extremely simple way, the work of the archaeologist or paleoanthropologist/scientist, are all strategies and actions that can approach the 'non-experts' to the ancient past. This contribution presents the experiences conducted in various contexts and the different types of proposed interventions, all aimed at the more correct and scientific dissemination of what represents the cornerstone of scientific thought: human evolution.

**Keywords:** *hands-on; learning by doing; human evolution; game; museums; human artifact; fire; archaeology excavation.*

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### 1. INTRODUCTION

The objects in traditional museum displays are often organized in a temporal sequence, requiring the public to have prior knowledge of their history or meaning (Pesarini, 2001). If hominid skull replicas or artifacts related to human evolution are the subjects of the displays, exposure to the temporal sequence becomes a limitation in comprehending difficult concepts (Hein, 1998; Pedretti, 2002; Hughes et al., 2007). Furthermore, understanding and envisioning such a "deeper time" where changes in organisms and the environment occurred can be challenging for both children and adults.

Instead, the "hands-on" approach or experiential education (Alison et al., 2017) allows for the exclusion of objects from the visual displays in museums. In this case, the traditional frontal lesson is outdated by the "learning by doing" experience (Dewey, 2004; Fiorucci et al., 2017), which proves successful in categorizing complex

information through active engagement.

In this discussion, three different approaches to informal scientific education about human evolution and archaeology are proposed, drawing examples from national and international museum experiences. These experiences include simulation of archaeological excavation, frontal lesson, and a play called 'CSI, investigation mission'.

### 2. THE SIMULATION OF ARCHAEOLOGICAL EXCAVATION

Simulation of archeological excavation is an excellent starting point to directly experience the work of the archaeologist and the scientific method firsthand (Fig. 1). Touching the soil, discovering what it contains, and then reconstructing the context, can kindle infantile curiosity. These positive emotions, linked to the discovery, can improve the learning process. A general overview of the existent link between emotions (positive or negative) and



Fig. 1 - The temporal sequence of excavation simulation: a) the findings, b), c) the details observed; d) the reconstruction of the skeleton.

the learning process is done by Mustafina and colleagues (2020). The difficulty lies in having quality materials, suitable for the simulation which must be as accurate as possible.

### 3. THE FRONTAL LESSON

If the frontal lesson is carried out immediately after a visit to a museum with the help of a replica, it recalls the memory (Fig. 2). Frontal lesson is generally a one-way process of message transmission and works better with an adult and aware audience while, in the case of children/

teenagers, it is a starting point for addressing a topic that will necessarily need to be studied.

### 4. CSI: INVESTIGATION MISSION

The game presented here is based on the very latest paleoanthropological news. It is inspired by the experience proposed by the Natural History Museum of London, Alice Roberts' book 'Evolution: The Human Story' (2018), and Manzi's book 'Il grande racconto dell'evoluzione umana' (2018).

Participants are divided into groups, and each





Fig. 2 - The frontal lesson in a) Casal de' Pazzi site and b) under the Blue's murals about evolution in Rebibbia quarter.

group chooses a replica of a hominid skull to which a hypothetical 'face' must be associated (Fig. 3). The operator, with his voice guide, guides them in the assembly of clues, which are scattered on various desks, and in various experiences to try, such as lighting a fire, observing minerals with a UV lamp, painting with ochre, measuring footprints, analyzing a coprolite, filling jugs with water to visualize cranial capacity, tanning a hide, and chipping a stone. The clues relating to one's skull are circled on a sheet in which they appear as photographs. In

this way, even preschool children can participate. At the end of the game, an envelope with three reconstructions inside is given to each 'team' of detectives. Based on the collected clues, the reconstruction is associated with the initially chosen skull. In the end, a reward is given to all participants.

This game works well for any audience because the gameplay provides an excellent 'hands-on' experience based on scientific background. It allows participants to be active contributors in the reconstruction of the 'skull' story.





Fig. 3 - Two operators with the human skull replica in Porto di Traiano archaeological area.

Inizio modulo

Fine modulo

The game can be played anywhere, and since it includes workstations, it also respects interpersonal safety distance (Fig. 4). One potential challenge could be finding suitable spaces to play the game effectively, but schools and museums often have outdoor areas that can be easily utilized.

## 5. DISCUSSION AND CONCLUSIONS

The experiences proposed to share some common characteristics, such as the ability to ‘touch’ the replicas and the presence of a specialized operator knowledgeable

in prehistoric themes. These foundations, along with the use of the game as a communication strategy, easily allow various types of audiences to feel like active protagonists rather than mere listeners. When possible, frontal lessons should be accompanied by these communication strategies that bring activities and ‘faces’ from a deep past ‘out of the history books’.

To maximize the impact of these experiences, it is recommended to organize a series of workshops or laboratories, starting with simulations of archaeological excavations and progressing to a ‘CSI-style play’. The process of developing these experiences and their impact on different audiences are presented in this paper. A more systematic and scientific study, including the collection of



Fig. 4 - ‘CSI’ game in *Lucus Feroniae* Museum.

questionnaires and data analysis, is currently underway and will be presented in a future publication.

Lastly, it is important to consider the media's role in shaping perceptions of human evolution in education and the potential for incorrect usage of evolutionary concepts. A recent study (Garibi et al., 2021) analyzed 220 news articles in Spanish digital and print media published between 2015-2015, focusing on the level of consistency with scientific knowledge concerning biological evolution. Garibi and colleagues found a statistically significant frequency of errors in the media, which play a crucial role in education.

In this regard, the importance of educational activities based on human evolution lies in fostering a critical-thinking approach among the public. Simulations, frontal lessons, informal scientific educational activities, and games conducted by professional human evolution educators can serve as important tools for disseminating accurate concepts and scientific knowledge.

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