Introductory Paragraph on

Science and Technology in the Education of a Conservator

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Session on ***Science and Technology in Higher Education on Restoration and Conservation of Movable Cultural Heritage***

1. Talal Akasheh (Keynote)
2. Franco Gugliermetti (From the virtual to the archaeological world. The challenge of the predictive computational models)
3. Recep Karadag (Project of restoration and conservation of Sultan Costumes in Topkapi Palace Museum)
4. Giovanni Gigante (A short introduction to Archaeometry of Ceramics)

Introduction

During an ICCROM workshop in the US it was agreed that a certain knowledge base is needed for a successful career in conservation. In addition, a number of skills and abilities are described to prepare a conservator of the highest calibre. **Common knowledge includes knowledge of terminology, ethics, history of conservation, cultural context, cultural history and cultural sensitivity, familiarity with allied professions, aesthetics, history, history of technology, preventive conservation, material science, health and safety, science and technology, analytical technologies, treatment of materials and methods and information technology. The required skills include hand-to-eye coordination and manual dexterity, research, problem solving, communications, management, marketing, outreach, computer skills, photography, digital imaging, grant writing and fundraising. Traits include patience, attention to detail, compromise, balancing many things, seeing the bigger picture and weighing consequences.** Arguably such qualifications are important but the scope of knowledge is difficult to amass by one person and, indeed, if possible would require many years of education and training.

I present an approach for specialization built around the type of conservation, or specifically the type of object to be conserved. Two levels of education are suggested. The first is the development of a three-year course for a technician in conservation. The second requires four to five years to produce a Master Conservator. The two levels must be specialized. For example, someone aiming at stone conservation does not necessarily have to study the conservation of metal. On-the-job training after this type of education is also necessary to become a full fledged conservator.

In addition, the conservator must be supported by other professionals specially trained for the conservation profession. Said professionals originate from BS/BA students, and must have an MS degree in one of the following disciplines: Archaeometry, Restoration and Maintenance of Historic Buildings, Conservation Science, Cultural Resource Management and Museology.

The approach I present may not be the only or the best approach, as I know that in Europe a description for the education and training of the conservator has been developed and standardized. However the presentation which relies on my experience in the founding of Queen Rania Institute of Tourism and Heritage at the Hashemite University in Jordan should raise debate over the issue of using science and technology in the protection of cultural heritage, and the

best means of training young professionals to take care of our cultural heritage.

Keywords: conservation of cultural heritage, training, professionals, science and technology

Prof. Gugliermetti gave a talk entitled **“From the Virtual Model to the Archaeological World”. The talk introduces predictive computation as** one of the latest applications in the world of ICT for cultural heritage; it studies and represents the environment through the resolution of complex mathematical equations that regulate thermal, visual, acoustic, fluid dynamic factors. The diffusion of archaeological predictive models has been progressive and to some extent unpredictable in when they were first introduced and seen with some diffidence: simple forecasting and design tools, intended primarily for architectural / engineering solutions related to the conservation of cultural heritage (coverings , microclimate, lighting, ventilation), or as mere exercises, often completely isolated from any historical and archaeological approach, by which to demonstrate the scientific basis of “running” an ancient reality (for example, the hydraulics of water distribution systems, ventilation in ancient warehouse etc..). As their reliability and calculation speed improved and with the introduction of more "friendly" interfaces, capable of transforming numerical results in virtual and dynamic images, easily understandable, the archaeologist’s sense of strangeness with predictive techniques is gradually decreasing, to such an extent that in some cases they could represent an essential "tool" for the historical interpretation of archaeological evidence. This tool in particular can create an informative network, identifiable with the acronym used for the web, "www", but with a meaning that extends beyond time and space: What it was, What it is and What will it be. An example for all is the virtual reconstruction of the acoustic in ancient theatres: the "www" means that it is possible to recreate ancient theatre acoustics by following the evolution and changes that have occurred over the centuries (What it was), or only considering its present state of archaeological evidence (What it is), or devise means to make it suitable for modern performances (What it will be) as part of its conservation and valorisation.
To these considerations must be added that the latest generation of predictive models enable three-dimensional graphical results that can be managed at different levels of detail and information, as a function of the end users (from tourists to archaeologists) well beyond the limits of “cultural rigidity” of many virtual reality models. This brief note intends to underline, by examples, the evolutions in predictive models and to show both their potentiality in covering many aspects in the field of conservation, valorisation and knowledge of cultural heritage, and their difference from 3D virtual and augmented reality models.

Prof. Gigante discussed the archaeometry of ceramics, describing their raw materials and manufacture and their main desirable material properties. Some of the experiments conducted in the laboratory included a study on the composition of atomic absorption, XRF, activation analysis and X ray diffraction. Physical properties usually measured are porosity and structural properties. Other commonly used techniques are 3D laser scanners, colorimeters and spectrophotometers, radiographic and tomographic systems, videomicroscopes, FP-EDXRF spectrometers. Firing temperatures and raw material provenance were also discussed.
Continuous development of new systems to study and control the state of conservation of works of art is very fruitful and the use of diagnostic procedures is becoming a very common practice, not only during restoration of ceramics but also during conservation in a museum.

Prof. Karadag discussed how dye analysis, technical analysis (weaving, yarn and spinning), metal analysis and colour measurements for the restoration and conservation of Sultan Costumes in the Topkapi Palace Museum collection were conducted. Restoration and conservation work was done in DATU-Natural Dye Research and Development Laboratory. This laboratory has the world’s richest collection of natural dyes. The collection consists of dye plants, dye insects, dye shellfish and natural lake pigments that have five hundred and fifty seven natural dye sources. The techniques used for this purpose were:

1. Dyestuff Analysis with HPLC
2. Technical analysis with Microscope
3. Metal threads analysis with SEM-EDX
4. Colour measurements
5. Translation of Ottoman Archive documents
6. Dyeing for restoration
7. Dating for restoration

The required sciences and skills needed for the restoration and conservation of this rich collection are Art History, Basic [missing words]

Keynote recommendations

The session stressed the multidisciplinary nature of the conservator profession. A conservator can be trained at two levels. The technician level is a three-year programme and specializes in two types of objects (i.e. stone and mosaics). The other level is for 4-5 years. The knowledge base needed by conservators is wide and the introduction of supporting professions is important, for example conservation science and archaeometry. These should be taught at MS level. Furthermore a large number of disciplines and scientific techniques are necessary to properly train restorers and conservators