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Teaching preventive conservation: preparing conservators for the complex world of interdisciplinary decision making

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Summary: *While conservators of art and archaeology are traditionally charged with the examination, material analysis, preservation, and treatment of cultural and artistic heritage, today they must also be prepared to engage with specialists in other disciplines on sustainable solutions for a wide variety of situations ranging from energy usage in built museums to preserving historic houses to managing archaeological sites. In order to succeed, conservators must be thoroughly versed in the concepts and practices of conservation, but also be able to understand complex interdisciplinary decision making.*
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1 Introduction

Since 1960, the Conservation Center of the Institute of Fine Arts (IFA-CC), New York University (http://www.ifa/nyu.edu/), has prepared students for careers in conservation through a four-year graduate program. The Conservation Center's curriculum comprises object-based study in the form of lectures, colloquia, limited enrollment seminars, and laboratory and field activities, taking advantage of the close relationship with New York City museums and institutions that provide access to their collections.

Preventive conservation has been identified as an essential professional competency and has become an important focus of all graduate programs in art conservation in the US (*Defining the Conservator: Essential Competencies*, ratified by the American Institute of Conservation (AIC) Board on May 20, 2003). At the IFA-CC, preventive conservation emphasizes environmental management for storage and display conditions, monitoring the environment, prioritizing preservation needs in large collections, and risk assessment. To balance theory and practice, there is a class project on refurbishing showcases focusing on current and new techniques for evaluating leakage, controlling microclimates, controlling pollutants and energy-efficient lighting such as LEDs. The challenge in preventive conservation is to utilize interdisciplinary decision-making tools to implement complex strategies. To achieve this, our program is designed to foster critical thinking, research and treatment skills, collaborative approaches, and a heightened interest in contextual issues.

2 Key players in the age of sustainability

Traditionally, conservators are trained to provide a breadth of background knowledge, for example in the areas of studio arts, chemistry, materials technology, art history, archaeology or anthropology. Technical training regarding treatment, documentation and investigation of objects within a collection is constantly changing, reflecting both the traditional and current demands required of a conservator in a museum or in private practice.

An increasing responsibility of conservators is about to emerge, due to the ongoing and lively debate on environmental guidelines for museum storage and display. Policies that have developed over the last few decades and have been broadly accepted [1-4] are currently under review by various decision makers. Rising energy costs have adversely affected the budget of many cultural institutions striving to provide appropriate environments for their collections. Because of a similar debate in Europe, the members of the Association of Art Museum Directors (AAMD) in the US have initiated a discussion on the potential broadening of environmental parameters for museum collections. A round table of experts at a meeting in Boston entitled *Rethinking the Museum Climate* proposed a set of interim guidelines, which ends with the statement: "Loan requirements for all objects must be determined in consultation with conservation professionals." [5]. Although conservators were always involved in risk assessment for collections and implementation of environmental policies in museums, the broadening of environmental guidelines for climate control will significantly increase their responsibility. Conservators will have to take the lead in decisions about which objects may go on loan, which artifacts need special climate control in showcases or what range of fluctuations are acceptable for a certain collection.

The current debate has also encouraged some to seek new solutions for environmental control in historic houses. We now recognize the necessity of reviewing traditional approaches to collection care while balancing the need to reduce the maintenance costs to the building, e.g. to assess more carefully the risk of damage as a result of condensation due to maintaining high RH values in the wintertime.

The practice of sustainable and environmentally sound preventive conservation must now be emphasized and fully integrated into the training of future conservators as part of their technical skill set and overall knowledge base. Students must also be prepared to follow the discussion about new energy saving technologies, such as LEDs, which have a high impact on sustainability, to understand the relative risk of new and traditional light sources on light sensitive materials [6].

3 Training in preventive conservation – lectures and exercises

The Conservation Center has updated its core curriculum after an intense review process. The new scheme of courses, fully implemented as of Fall 2008, has introduced Preventive Conservation as a separate course required for all second year students regardless of future specialization. Now, with three years of experience in teaching the new format, is an opportune time to summarize the experiences gained.

3.1 Format

The course *Preventive Conservation* is held in the spring term and comprises 14 two-hour sessions to introduce students to all relevant issues of the museum environment: temperature and relative humidity, gaseous and particulate pollutants, light, and biological attack. The essential role of these parameters in the process of deterioration of cultural property are investigated, building on knowledge previously acquired during courses on "Materials Science" (first year) and "Instrumental Analysis" (second year). Guidelines for storage, display, and transport of art objects are reviewed, taking into account the interaction of historic materials with their environment.

Each student is required to take the lead in one major experiment, to complete a report on it and give an oral presentation on the experimental setup, the progress of the work, and the final outcome. The projects include practical exercises on risk assessment and environmental monitoring in historic houses or museums, participation in ongoing research on microclimates, and hands-on training to refurbish showcases at the Conservation Center:

Projects in spring 2009

J. Hickey: Risk Assessment of The Seventh Regiment Armory Board of Officers Room

L. Conte: The Collection of Moveable Objects in the Central Corridor at The Park Avenue Armory

B. Feston: Plan for retrofitting silver showcases at The Park Avenue Armory

R. Chao: Climate Control at Morris Jumel Mansion

L. Nelson: Light Monitoring at Morris Jumel Mansion

J. Bottkol: Conservation Center Display case rehabilitation project

A. Holden: The Conservation Center Display Cases: A Study of the Climate Control and Air Exchange Rate

K. Sanderson: The redesign of display case lighting at the Conservation Center

Projects in spring 2010

J. Ellis: Lighting and Showcase Design for Works of Art on Paper

K. Robinson: Lighting Works of Art - An Assessment of Three Paintings Galleries at the Metropolitan Museum of Art

K. Patterson: Perception of Color Temperature and Light Damage: Considerations in Designing Exhibition Lighting

L. Boyer: The Insulation of Building Envelopes

K. Watson: Testing the Oddy Test: Exploring the Use of Zinc as an Indicator for Organic Acids

J. Pace: Performance Evaluation of Silica Gel

J. Sybalsky: Measurement and Control of Gas Exchange in a Renovated Exhibition Showcase

3.2 Showcase refurbishment projects

The exercise on showcase refurbishment reflects the skills and background knowledge the students should learn within a course on *Preventive Conservation*. Information from different fields needs to be connected and evaluated, e.g. to decide the extent that a case should be sealed, thus balancing the risk from pollutants generated within the case versus the fluctuations from the climate outside the case. From the extensive literature available in different journals, only a few key references can be quoted in this article [7-11].

In this section, the planning phase (steps 1 to 4) and the hands-on work (steps 5 to 10) are described for the individual projects (spring 2009) and the group exercises (spring 2010; works are ongoing) on showcases at the Conservation Center:

Step 1: Researching the history and assessing the conditions of the cases:

The Conservation Center moved into its current residence in a former town house in 1983. Seven showcases were installed along the walls of the front staircase, rather as an afterthought than as part of the original plan. Since fire code stipulations needed to be respected, the architect chose to insert the showcase within the thick exterior wall of the building. They are used to display prominent objects from the Center's study collection.

The current condition of the cases is not satisfactory from an aesthetic and a collections risk perspective. Dirt patterns are evident on the fabric lining due to leakage through the front door and the wooden backboard. Silica gel compartments, originally installed but neglected with time, did not sufficiently buffer the climate fluctuations in the staircase. Fluorescent tubes installed vertically in each corner provided inadequate and uneven light within the case (see Fig. 1).

Fig. 1. *One of seven showcases in the staircase of the Conservation Center, as installed in 1983*

Step 2: Defining the purpose of the cases:

The showcases will be used to display objects from the study collection, including sensitive organic (prints and rare books) and less sensitive inorganic (Greek ceramics, stone collection) materials.

Step 3: Evaluating the building envelope and the macroclimate:

The Center has limited climate control, providing stable temperatures but lacking adequate humidity control, especially during the humid summer period.

Step 4: Defining the target conditions:

The cases need to provide a buffer for fluctuations in temperature (basically induced from the poorly sealed back side) and relative humidity (caused by high leakage of the building envelope).

Step 5: Selecting and testing new construction materials:

The glass shelves will be retained after refurbishing. Oddy tests were performed for all materials to be introduced, such as the new textile, the gasket material, and the sealing material.

Step 6: Dismantling the case:

The old fabric was removed and a painted backboard was uncovered. The old silica gel was discarded and the fluorescent tubes were removed.

Step 7: Refurbishment:

An additional new backboard was introduced, firmly sealed to insulate and isolate the back wall. A barrier film was applied to all interior surfaces and new fabric was applied on all visible surfaces. One of the most challenging aspects was to design a system to gasket and seal the hinged doors.

Step 8: Controlled leakage and RH control:

The goal is to achieve a low leakage rate and to buffer RH fluctuations with silica gel. The students calculated the necessary amount of silica gel and proposed creative solutions for incorporating the silica gel containers in the shallow case with limited space for placing buffering materials. Also, the air exchange between the silica gel compartment and the display area within the case was investigated in mock-ups simulating case conditions.

Step 9: Installation of appropriate lighting:

The challenge of providing lighting for a shallow showcase was met by introducing two LED bars in horizontal positions (at the top and in the middle of the case), attached to the glass shelves. The beam of the LEDs was elliptically shaped and the lighting was further improved with a bending film to optimize even light distribution (Fig. 2) (fixtures provided by Art Preservation Services, New York, http://www.apsnyc.com/).

Fig. 2. *Showcases after refurbishment and installation of LED lights*

Step 10: Monitoring current conditions (Fig. 3):

A FLIR P640 Infrared Camera was used for imaging the thermal conditions within all parts of the case, highlighting the difference in temperature between the exterior and interior wall. The leakage rate of the case was determined, using carbon dioxide as a tracer gas, measured with a CO_2 detector/logger. Data loggers were also used to measure relative humidity and temperature. An Ocean Optics USB2000+ Spectrophotometer was used to study the wavelength distribution and the color temperature of various light sources. A novel method of measuring light intensity and distribution was carried out with a combination of a light meter and a luminance meter so that the readings can be taken from a point outside the case.

Fig. 3. *Monitoring campaign*

4 Conclusions

Teaching preventive conservation cannot be based on a one-dimensional approach. It requires an understanding of a multitude of intersecting disciplines. In addition to the traditional role of recommending safe environmental parameters for collections, today's conservator must work even more closely with facilities managers, engineers, registrars, and architects on establishing conditions that are sustainable in terms of energy and preservation. New lighting technologies require a close collaboration with the exhibition and lighting team. New methods for evaluating and implementing microclimates rely on an understanding of leakage testing and proper use of active and passive RH control systems, an area of expertise that primarily falls within the responsibilities of the conservator. The challenge for training in preventive conservation is to familiarize students with both the decision making process and the application of technical tools to meet these complex demands.

5 References

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