

EDUCATOR GUIDE

Story Theme: Preservation
Subject: The Conservators of the Fine Arts Museums
of San Francisco
Discipline: Visual Arts

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The conservators of the Fine Arts Museums of San Francisco scan a painting to detect damage and past repairs. Still image from SPARK story, February 2004.

SECTION I - OVERVIEW

EPISODE THEME

Preservation

SUBJECT

The Conservators of the Fine Arts Museums of San Francisco

GRADE RANGES

K-12 & Post-secondary

CURRICULUM CONNECTIONS

Visual Arts
Language Arts

OBJECTIVE

To illustrate the need for, and the goals and methods of a fine arts conservation team through the FAMSF Conservation Department.

STORY SYNOPSIS

SPARK goes behind the scenes with two conservators with the Fine Arts Museums of San Francisco conservators to get a glimpse into their painstaking work as they strive to restore and preserve some of the treasures of the art world

INSTRUCTIONAL STRATEGIES

Group discussion
Teacher-guided instruction
Hands-on individual projects
Hands-on group projects
Critical reflection on personal expressions and how they are seen and received by others

INSTRUCTIONAL OBJECTIVES

To introduce students to the importance of conservation in fine arts
To provide context for the understanding of conservation in terms of preserving heritage and culture
To inspire students to consider conservation on a broader level in their own communities

EQUIPMENT NEEDED

SPARK story “Preservation” about the conservators of the fine arts museums of San Francisco on DVD or VHS and related equipment
Computer with Internet access, navigation software, speakers and a sounds card, printer

MATERIALS NEEDED

Access to libraries with up-to-date collections of periodicals, books, and research papers
Pencils, pens, and paper

INTELLIGENCES ADDRESSED

Bodily-Kinesthetic - control of one's own body, control in handling objects
Interpersonal - awareness of others' feelings, emotions, goals, motivations
Intrapersonal - awareness of one's own feelings, emotions, goals, motivations
Spatial - ability to manipulate and create mental images in order to solve problems
Logical-Mathematical - ability to detect patterns, reason deductively, think logically



See more information on Multiple Intelligences at www.kqed.org/spark/education.

SECTION II – CONTENT/CONTEXT

CONTENT OVERVIEW

When San Francisco's M. H. de Young Museum closed its doors in 2000 to begin construction on a new building, nearly 20,000 paintings, sculptures, furniture and other objects were moved into storage. Museum conservators took advantage of this hiatus to tend to works long in need of restoration. In "Preservation," Spark makes a rare visit to the conservation studio, where Tony Rockwell and Carl Grimm, two highly trained "art doctors" on the conservation staff, apply art and science in equal measure to bring the dirty, torn, chipped, and broken back to their original splendor.



Conservator Tony Rockwell painstakingly restores sections of a painting recently attributed to El Greco in the collection of the M.H. de Young Museum. Still image from SPARK story, 2003.

The M.H. de Young Museum and the Legion of Honor are part of a single organization called the Fine Arts Museums of San Francisco, which, among others, shares a conservation staff. This dedicated staff includes specialized professionals in the areas of painting, sculptures, furniture, textiles, and works on paper. Together with the curators, the conservation staff carefully monitors all of the works in the Fine Arts Museums' collections, working on those that require conservation or preservation. In some cases, like that of George Bingham's The Boatmen of the

Missouri River, it may take a museum many years to finally remove a work for conservation because the piece is such a powerful attraction for visiting audiences.

There are two critical aspects to taking care of works of artistic and historical value—conservation and preservation. Conservation is concerned with the correction of problems affecting a work of value, such as previous repairs and damage. Preservation is a proactive practice, seeking to prevent and/or minimize the effects of environmental and other factors on a work. Quality conservation efforts require a combination of art, science, and ethics. While Rockwell and Grimm conserve paintings, conservation is an important measure for all artistic or historical works including textiles, books, maps, audio recordings, films, video recordings, sculpture, paintings, drawings, prints, photographs, historical objects, scientific and mathematical instruments, and clothing. With this great diversity of types of works to maintain, conservators are key staff members at many different types of organizations, such as fine arts museums, historical centers, archives, cultural centers, and libraries.

THE BIG PICTURE

Conservators are educated and trained in the examination, stabilization and treatment of artistic and historical works, and in general principles of collection care. Conservation demands a broad background in science, the arts, and the humanities to ensure that the best decisions are made for the conservation and preservation of each individual work. While today conservators are graduates from advanced degree programs, for generations those interested in becoming conservators learned by apprenticing practicing professionals in a workshop or institutional setting.

THE BIG PICTURE (continued)

Conservation techniques need to combine the most up-to-date scientific techniques with an authentic recreation of the original craftsmanship. Some of the subjects in which a conservator is trained include materials science, history of art, archaeology, art and artifact technology, craft skills, preventive maintenance and treatment techniques, as well as conservation history, ethics, and philosophy. Those studying conservation typically specialize in an area of interest, which allows them to hone specific skills and knowledge about particular materials and objects including textiles, wood, paper, photographs, documents and manuscripts, architecture, fine art works, natural science collections, and anthropological, historical, and decorative objects.



George Bingham's [The Boatmen of the Missouri River](#) is prepared for scanning by Carl Grimm. Still image from SPARK story, May 2003.

Conservation and preservation go hand in hand in the care of artistic and historical works. This tandem practice of conserving damaged and aging works and preserving them sustains our cultural treasures for the future. The methods of conservation and preservation include a great variety of treatments, including repairing structural damage, retouching areas of aesthetic damage, removing previously applied materials and varnish, cleaning, and re-varnishing. Any or all of these measures can be used to maximize the life of a particular work, to return it to its original appearance or a state very close, and to preserve its historic integrity.

SECTION III – RESOURCES

TEXTS

Assessing the Values of Cultural Heritage. Research Report. The Getty Conservation Institute, 2002.
[Periodical.] Journal of the American Institute For Conservation (JAIC)

Bomford, David. Conservation of Paintings (National Gallery Pocket Guides Series). Yale University Press, 1998.

Nicolaus, Knut and Christine Westphal. The Restoration of Paintings. Konemann Press, 1999.

Taft, W. Stanley, and James W. Mayer. The Science of Paintings. Springer Verlag, 2000.

Whelchel, Harriet, ed. Caring For Your Collections. Harry N. Abrams, 1992.

WEB SITES

American Institute for the Conservation of Historic and Artistic Works (The) – Resource Web site including strategies for preserving paintings, photographs, and textiles. - <http://aic.stanford.edu>

Arkansas Historic Preservation Program – The Arkansas Historic Preservation programs include tax incentives, easements and grants for restoration of historic homes; Main Street Arkansas downtown revitalization project; antebellum cotton plantation virtual tour, Civil War Battlefield Update and walking tours of landmarks on the National Register of Historic Places. The Web site includes overviews of all program aspects as well as lesson plans for K-grade 12 preservation projects. - <http://www.arkansaspreservation.org>

CoOL, Conservation On Line – Resource site for conservation professionals, including a wide array of articles on conservation topics, current news, and an author index - <http://palimpsest.stanford.edu>

WEB SITES (continued)

AATA Online: Abstracts of International Conservation Literature – Comprehensive international database of literature about conservation issues and projects, including methods of conservation, general topics, archeological methods, architectural conservation, materials and objects, and many more categories. - <http://aata.getty.edu/NPS>

ConservArt Associates, Inc. – Conservation pages for a company dedicated to museum quality conservation both for traditional works of fine art and for large-scale works of contemporary art and architecture. - <http://www.conservartassoc.com/faqs.html>

Getty Institute Conservation Institute (The) – The conservation arm of the Getty Museum dedicated to serving the conservation community through scientific research; education and training; field projects, and the dissemination of the results of both its work and the work of others in the field - <http://www.getty.edu/conservation>

Il Cenacolo – The Web site for Santa Maria delle Grazie, the structure that houses Leonardo’s Last Supper, and Donato Montorfano's Crucifixion, including information about original condition and restoration treatments. The site is managed by a Regional Office for the Protection of Monuments, a branch of the Superintendency for Environmental and Architectural Heritage of Milan housed in up in the Convent of Santa Maria delle Grazie. - http://www.cenacolovinciano.it/html/eng/cenacolo_01.htm

International Institute for the Conservation and Preservation of Historic and Artistic Works - <http://www.iiconservation.org>

WEB SITES (continued)

Michelangelo's Sistine Chapel Web sites with images – some before, others after restoration. -

<http://www.cegur.com/Michelangelo/RestorationProcess.html>

<http://www.kfki.hu/~arthp/tours/sistina/index.html>

<http://www.christusrex.org/www1/sistine/0-Tour.html>

Minneapolis Museum of Art Restoration Web pages titled "Restoring a Masterpiece" chronicling the step-by-step process restoration of Giovanni Benedetto Castiglione's The Immaculate Conception with Saints Francis of Assisi and Anthony of Padua through scientific notes, photographs, and a daily progress log. Pop-up pages extensively document the perspectives of conservators, art historians, curators, and the general audience, including assessment, strategies for treatment, and restoration from the perspective, frequently asked questions, the life of the painting, and its historical significance. An outstanding instructional resource for educators. -

<http://www.artsmia.org/restoration-online>

National Center for Preservation Technology & Training (The) – An interdisciplinary program of the National Park Service to advance the art, craft and science of historic preservation in the fields of archeology, historic architecture, historic landscapes, objects and materials conservation, and interpretation. NCPTT serves public and private practitioners through research, education and information management. Also a gateway Web site to 4 federal preservation and conservation organizations: Federal Preservation Institute, Heritage Education Initiative, Cemetery Conservation, and Engineers and Historic Preservation Training. <http://www.ncptt.nps.gov>

National Gallery of Art Resources page featuring 6 non-professional level texts about conservation and preservation techniques and examples. -

<http://www.nga.gov/shop/bookcons.htm>

Philadelphia Museum of Art Web site conservation pages -

<http://www.philamuseum.org/collections/conservation>

WEB SITES (continued)

Olga Nicolici-Litwin – Web site for a private conservator specializing in the restoration of paintings, including before and after examples of restorations along with descriptions of the applied restorative treatments. -

<http://www.patinapal.com/main-onartconservation.html>

Rebecca Pavitt – Web site for a private conservator specializing in the restoration of artworks on paper and textile grounds, including before and after examples of restorations along with descriptions of the applied restorative treatments. -

http://www.fineartconserve.com/pages/20_about.html

San Francisco Architectural Heritage – Web site for SF organization dedicated to preserving historical architectural structures. -

<http://www.sfheritage.org/home.html>

Sargent Murals at the Boston Public Library – informational Web site dedicated to the history, Interpretation, and Conservation of the murals painted by renowned American painter John Singer Sargent inside the Boston Public Library. -

<http://www.sargentmurals.bpl.org/index.html>

University of Delaware Library Subject Guide of Internet Sources for Conservation, including a broad range of links to conservation Web sites and resources. -

<http://www2.lib.udel.edu/subj/artc/internet.htm>

University of Pennsylvania – Overview of the restoration of the Last Supper. -

<http://ccat.sas.upenn.edu/~lbianco/project/home.html>

BAY AREA FIELD TRIPS

Asian Art Museum – Civic Center, San Francisco – www.asianart.org

Berkeley Art Museum/Pacific Film Archive - U.C. Berkeley - <http://www.bampfa.berkeley.edu>

California Historical Society, San Francisco - www.calhist.org

BAY AREA FIELD TRIPS (continued)

California Palace of the Legion of Honor, San Francisco – European decorative arts and paintings, Ancient art, and one of the largest collections of prints and drawings in the country. -

<http://www.thinker.org/legion/index.asp>

Crocker Art Museum, Sacramento – California art and European drawings, contemporary Northern California art and, more recently, of East Asian painting and international ceramics -

<http://www.crockerartmuseum.org/>

de Young Memorial Museum (The) Golden Gate Park, San Francisco - American paintings, decorative arts and crafts; arts from Africa, Oceania and the Americas; textiles - <http://www.thinker.org/deyoung/>

di Rosa Preserve (The), Carneros, Napa – Works by California artists from 1960s to the present -

www.dirosapreserve.org

Iris and B. Gerald Cantor Center for Visual Arts at Stanford University www.stanford.edu/dept/ccva

Museum of the City of San Francisco, SF -

www.sfmuseum.org

Napa Valley Museum, St. Helena -

<http://www.napavalleymuseum.org/>

Oakland Museum of California (The), Oakland – Fine art and local and state history - www.museumca.org

San Francisco Museum of Modern Art -

www.sfmoma.org

San Jose Museum of Art – 19th and 20th century art -

www.sjmusart.org

Treasure Island Museum, San Francisco
Exhibitions about the US Navy, Marines and Coast Guard in the Pacific, including lighthouses the 1939-40, the World's Fair (Golden Gate International Exposition); Yerba Buena, and Treasure Islands; the Trans-Pacific Pan American China Clippers; and the Bay and Golden Gate Bridges -

www.dicthyon.com/treasure

SECTION IV – VOCABULARY

DISCIPLINE-BASED VOCABULARY AND CONCEPTS IN THE SPARK STORY

Abrasion

The scratching or rubbing of paint that affects its color, usually reparable

Bingham, George

American painter (1811-1879), born in Virginia, raised in Missouri, and educated at the Pennsylvania Academy of Fine Arts (1837). Bingham was an accomplished portrait painter in his early career, although his primary artistic interest was genre scenes of the low-lying river areas, such as The Boatmen of the Missouri (1846).

Cleaning

The removal of the aged and/or discolored varnish from a painting using different conservation solvents and techniques

Conservation Scientist

A professional who applies scientific knowledge and skill to the conservation of artworks and objects in accordance with an ethical code (such as the American Institute of Conservation Code of Ethics and Guidelines for Practice)

Conservation

The profession devoted to the preservation of art and objects

Conservator

A professional dedicated to conserving artworks and objects; one who develops and implements conservation activities in accordance with an ethical code

Documentation

The recording in a permanent format of information derived from conservation activities on artworks and objects.

El Greco

A Spanish Mannerist painter born Domenikos Theotokopoulos on the island of Crete (1541-1614), El Greco was listed as a master painted in Candia by 1566. It is believed that El Greco studied in Italy in the 1560 and 70s, finally relocating to Spain by 1577 where he completed numerous masterpieces with his workshop of students

Examination

The investigation of the structure, materials, and condition of artworks and objects including the identification of the extent and causes of alteration and deterioration

Flaking

Loss of paint flakes in several areas, usually indicative of poor adhesion between paint film and gesso ground or between two paint layers. Usually total loss if not lined to reattach paint

In-painting

The application of paint in the damaged areas of a painting so as to restore it to its known or an as-close-to original state as possible

Master

An artist, performer, or musician of consummate skill whose works serves as models or ideals

Masterpiece

A work of extraordinary skill; an exemplar of its type or kind

Over-painting

The application of paint in an area of damage and other areas of a painting (Today, this method is not considered an acceptable conservation technique, although it was actively used in the past)

Pigment

A finely divided, insoluble substance that colors the material to which it is added

Preservation

The protection of artworks and objects through activities that minimize chemical and physical deterioration and damage and that prevent loss of informational content

Primer

A ground (such as gesso) applied to a support (such as a stretched canvas or board) in preparation for the painting in order to create a consistently absorbency surface of uniform texture and color (usually white)

Repainting

The restoration of damaged or missing sections of a painting or object to a known or state as-close-to as its' original condition as possible

Restoration

Treatments intended to return artworks and objects to known or states as-close-to original as possible, often achieved by cleaning and the addition of new materials

Retouching

Restoring damaged or missing sections of an artwork or object to its original value

Stretcher

A wooden frame over which canvas or linen is stretched

Treatment

Alteration of the chemical and/or physical characteristics of artworks and objects designed to extend longevity

Varnish

A surface film, usually transparent resin, usually applied to the surface of a painting to provide protection

SECTION V – ENGAGING WITH SPARK

STANDARDS-BASED ACTIVITIES AND DISCUSSION POINTS

Exploring Conservation and Preservation

Discuss the idea of conservation with the students before watching the SPARK story. Ask students what they understand and know about conservation and/or preservation of historical and artistic works?

Based on the information in this Guide and the SPARK story, discuss the concepts of preservation and conservation and the differences between them. Ask students to name works or buildings in the local communities that have been conserved and why? Explore the importance of preserving and conserving those works, asking students to articulate what they think the criteria are for conserving and preserving these local works?

Brainstorm a list of national artistic and historical works, buildings, and landmarks that have been conserved and/or preserved. Individually or as a group, locate images of the works, inviting students to respond to the following questions:

- * What importance are these works to the community and its members?
- * What value do they have for an American?
- * What value do they have for the immigrants?
- * What value do they have for tourists?
- * What part do they play in communicating an idea about America to its inhabitants and visitors?

Move on to brainstorm additional artistic and historical works that are not in their list but are important to conserve/preserve for the future. Ask students to express why they think these particular works should be preserved? What is their importance? How is this importance gauged? How can they be preserved? If consensus on a particular object, tradition, or location can be reached, write a letter as a class to a local government representative, museum or historical society about the importance of conserving/preserving the work.

RELATED STANDARDS

VISUAL ARTS

Grade 3

HISTORICAL AND CULTURAL CONTEXTS

3.4 Identify and describe objects of art from different parts of the world observed in visits to a museum or gallery (e.g., puppets, masks, containers).

Grade 4

ARTISTIC PERCEPTION

1.5 Describe and analyze the elements of art (color, shape/form, line, texture, space and value), emphasizing form, as they are used in works of art and found in the environment.

AESTHETIC VALUING

Make Informed Judgments

4.4 Identify and describe how various cultures define and value art differently.

Grades 9-12, Proficient

Career and Career-Related Skills

5.4 Demonstrate an understanding of the various skills of an artist, art critic, art historian, art collector, art gallery owner, and philosopher of art (aesthetician).

RELATED STANDARDS

SOCIAL SCIENCE

Grades 1-12 – All standards

NOTE: The conservation and preservation of artistic and historical works can be discussed in relation to any period of history cited in the Social Studies Standards, including - ancient Rome, Mesopotamia, Greece, Mexico, Europe, Egypt, India, China, Japan, Philippines, Asia, Africa, and the US. Students can discuss the present state of artistic and historic works in museum collections, pictured in books, accessible in a database, and/or viewable on the Internet, addressing some of the questions of cultural value listed in this Guide.

Researching a Conserved/Preserved Work

As a group or individually, ask students to select an artistic or historical work, cultural practice, and/or structure that has been conserved and/or preserved upon which to develop a research project. The research should document the artistic or historical work, cultural practice, and/or structure in different ways, including (but not limited to):

- photographs
- representations of the work and/or structure in paintings, drawings, prints
- citation of the work and/or structure in city, county, or state records
- oral stories and histories from community members (recorded or transcribed)
- references to the artistic or historical work and/or structure in diaries, newspapers, maps, stories, books, and poems
- inventories or indexes referring to the existence, acquisition and/or exhibition of work

Challenge students to assemble their research into a presentation for the class, making a case for the importance of the work and why it should be conserved or preserved. Whenever possible, encourage students to include musical performance, storytelling, theatre, fine arts, poetry, etc. in their projects.

Provide a presentation opportunity for the students to share their projects with the school and/or community through an open house, exhibition, etc. If a particular work or building is being considered for conservation or preservation, follow the process of the discussion, attending and presenting at public hearings if available.

Organizing Field Trips

Schedule a class field trip to a nearby historical society or museum to view a collection of artistic or historical works, preferably one related to a topic being studied in the core curricula, such as:

- Fossils
- Skeletal remains
- Gems or geological formations
- Historical scientific or mathematical instruments
- California history
- Early written documents
- Maps
- Documentary photographs

- Historical prints, paintings, sculptures and/or drawings
- Documentation of civic projects or urban planning

Before visiting the works, talk with students about what types of objects they think might be in the collection based on its title or the host institution? If visiting an historical center or a museum, conduct a preparatory visit beforehand to survey the contents of the exhibition and to formulate connections between the works on view and any related classroom curricula, standards, or goals.

Create an interactive activity with questions to guide student participation in the exhibition, including fill-in-the-blank questions about names, events, and dates, artists and creators, early uses of certain objects and materials, etc. Also include drawing activities and poetry to challenge students to draw a portrait of how a person might have used one of the objects on view, or to write a poem or short story about a person pictured in a painting or photograph. Include lengthier questions about the historical importance and/or intention of different objects, asking for written, narrative responses from students in which they situate the objects within their own knowledge of a subject or time period, or within the history described in the exhibition.

For small groups of students, arrange a field trip to a museum conservation or collections department. Some museums offer guided tours of conservation labs, archives, storerooms, and/or collections (objects not currently on view). To begin, inquire with a museum's conservation departments and/or visitor services about collections or conservation lab tours.

Once a visit has been arranged, develop guided activities or questions for students to consider during the tour, including questions about the objects in the collection, important dates and/or facts, and artists/inventors. Consider asking that students are shown particular objects related to the curricula, a particular book or event recently shared, an upcoming holiday or event, or a common cultural heritage.

Many museums and history centers, like the M. H. de Young Museum, have education departments that offer lessons or resource packets for educators to maximize the potential of the collection.

The de Young Museum featured in the SPARK story provides educational resources for families with children, high school students, and K-12 educators, including the following 6 lesson plans, which are available at

<http://www.thinker.org/fam/education/subpage.asp?subpagekey=19>.

1. Learning to Look at American Paintings
2. Colonial America
3. The Early Republic and Western Expansion 1800-1850s
4. The Civil War 1850s-1860s
5. California and the Gold Rush
6. The Industrial Revolution 1870s-1880s

SPARKLER:

* Visit a particular exhibition at a museum or historical center and, without preliminary research, write a paper based only on what is learned from the works exhibited. What story or stories does the exhibition tell? How does it tell it/them? What are the elements of each story? What is left out of the stories? What artistic and/or historical objects need to be included to complete the story? How could they be included?

RELATED STANDARDS SOCIAL SCIENCE

Grades 1-12 – All standards

NOTE: Artistic and historical works and their conservation and preservation can be included as resource materials when studying American history, or the historical and living cultures of other cultures cited in the Social Studies Standards, including - ancient Rome, Mesopotamia, Greece, Mexico, Europe, Egypt, India, China, Japan, Philippines, Asia, and Africa. Include discussion about the present state of artistic and historic works held in museum collections, pictured in books, accessible in a database, and/or viewable on the Internet.

Scientific Investigations

Consider a work of artistic and historical importance that has been conserved. Chart the conservation treatment by looking at photographs taken before and after. Prior to conducting research on the treatments, challenge students to guess (by looking at the before and after images) what

types of conservation treatments were applied. Some excellent restoration examples to refer to or use for this exercise include: 1) John Singer Sargent murals at the Boston Public Library, 2) Castiglione's The Immaculate Conception with Saints Francis of Assisi and Anthony of Padua at the Minnesota Museum, 3) Michelangelo's Sistine Chapel at the Vatican Museum, 4) Leonardo da Vinci's Last Supper in Milan. (All of these restoration projects are referenced in the Resources section of this Guide.) Talk about the importance of these four different works of art as well as the plans for, execution of, and responses to the restorations.

As a class, discuss the chemistry of painting using a real painting(s) as an example. Through group discussion, name all of the compounds and mixtures in the painting, such as: paints (all colors), grounds (paper, canvas, gesso, etc.) suspensions (water, acrylic, oils), additives (wax, oils, etc.) and varnishes, sculptural materials (clay, wood, glass, resins, etc.), writing materials (ink), and adhesives (glues), or moisture, c) vandalism, d) infestation, or e) mold. Define the type, form, and extent of the damage to the painting and then propose solutions to restore the painting. (Refer to the Minnesota Museum or Sargent Murals/Boston Public Library conservation Web sites listed in the Resources section of this Guide.)

For scientific investigation and experimentation students can:

- Examine artistic and historical works through scientific methods of inquiry, using magnifying glasses, microscopes, chromatographic analyses, as well as visual survey of the surface,
- Through research into materials and timelines, formulate hypotheses about the original condition of the work,
- Locate areas of damage and form
- Hypothesize about cause(s), such as moisture, heat, erosion, migration, mold, insect damage, etc.
- Formulate possible solutions for reparation of damage based on existing chemical composition of a work.
- Present reasoned proposals for the conservation and/or preservation of a work, including projected results.

Challenge students to write the chemical equations for a selection of the compounds. Then explore what would happen if the painting were damaged through a) fire, b) moisture, c) mold, etc.

Explore the damage that environmental factors (moisture, heat, sun, living organisms) can have on artistic and historical works. Research the types of biological organisms that attack different artistic and historical works, perhaps choosing an object owned by the school as an example. By researching the life cycles, eating, digestive, waste, and reproductive habits of the organism that the work is hosting, assess the damage that the organism has caused and predict the effects that it will have in the future if allowed to continue.

Challenge students to research different treatments that would control further damage to the work. Ask students to propose their solutions to the class and invite students to vote for the best method.

SCIENCE SPARKLER:

* Consider the various scientific tests carried out by a conservation laboratory, including x-ray fluorescence spectroscopy (XRF), Fourier transform infra-red spectroscopy (FITR), reflected and transmitted ultra-violet visible spectroscopy (UV/VIS), gas chromatography-Mass spectrometry (GC-MS), x-ray diffraction (XRD), scanning electron microscopy (SEM), and metallographic examination. Research what each of these instruments does, who invented it, its original purpose, and its present uses and explain how the instrument is used in the conservation of artistic and historical works.

RELATED STANDARDS

SCIENCE

Grade 1

PHYSICAL SCIENCES

a. Students know objects can be described in terms of the materials they are made of (e.g., clay, cloth, paper) and their physical properties (e.g., color, size, shape, weight, texture, flexibility, attraction to magnets, floating, sinking).

Grade 3

PHYSICAL SCIENCES

g. Students know that when two or more substances are combined, a new substance may be formed with properties that are different from those of the original materials.

Grades 1 – 12

NOTE: Conservation can be used in the investigation and experimentation of any grade science curricula, including:

Chemistry - identify the chemical properties of artistic media - paints, grounds (paper, canvas, gesso, etc.) suspensions (water, acrylic, oils), additives (wax, oils, etc.) and varnishes, sculptural materials (clay, wood, glass, resins, etc.), ink, and adhesives.

Life sciences/ biology – effects of air, heat, moisture, environmental contents, mold, and insects and animals on artistic and historical works.

For more information about SPARK and its educational content, including the Visual & Performing Arts Standards, visit the Web site at <http://www.kqed.org/spark/education>.



For more information about the California Visual & Performing Arts Standards, visit the CA Dept. of Education at <http://www.cde.ca.gov/ci/>.