A Curator’s Dilemma: Teacher Guide

Subject: Biology
Grade Level: High School 9-12

Case Summary
Do you know how to identify the composition of fabric? Follow the young curator as she uses the science behind art conservation in processing a gift to the museum.

Credits
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This case was adapted using Fiber Identification Lab (Smith, Commander, Etre, & Stein), 2013). Stein, R., Smith, T., Etre, K., & Commander, J. (2013). The Science Behind Art Conservation, July 8-12, 2013, Fiber Identification Lab 6, manual from workshop sponsored by Emory University Carlos Museum.

Learning Objectives
1. Learns to recognize plant and animal fiber characteristics
2. Learns to recognize man-made fiber characteristics
3. Uses technology
4. Recognizes the importance of explaining data with precision and accuracy

Georgia Performance Standards
SB1. Students will analyze the nature of the relationships between structures and functions in living cells.
   c. Identify the function of the four major macromolecules (i.e., carbohydrates, proteins, lipids, nucleic acids).

SCSh2. Students will use standard safety practices for all classroom laboratory and field investigations.

SCSh3. Students will identify and investigate problems scientifically.

SCSh4. Students use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.
Assessment

• Students who demonstrate understanding can construct an explanation based on evidence for how the structure of fibers is indicative of their composition and function.
• Students will record their results by sketches of magnified fibers and the description of burn time/combustion products.
• Student will draw conclusions about the composition of the fabrics.
• Students will demonstrate an extension of learning by constructing flowcharts, timelines, and pamphlets.

Implementation Strategy

Day 1:

• Distribute student materials- scene, box chart, resources, and Fiber Identification lab.
• 15 minutes- Students will read the scene and complete the box chart.
• 15 minutes- Students will be introduced to the operation and parts of the microscope using demonstration and diagrams.
• 30 minutes- Students will learn to make a wet mount and observe by performing lab exercise part A and B, letter “e” and human hair.
• Homework- Students should look through resources and make a chart of the types of natural and synthetic fibers and their characteristics.

Day 2:

• 30 minutes- Students will make and observe wet mounts of natural fibers.
• 15 minutes- Students will conduct flame tests of natural fibers.
• 15 minutes- Students will repeat wet mounts and flame tests with synthetic fibers.
• Homework- complete Analysis questions and look through resources.

Day 3:

• Students should construct a flow chart of fabric identification by fiber analysis.
• Students can construct a timeline of fabric and fashion using appropriate images.
Facilitator Guide

Day 1:

- Hand out the materials to students and allow groups to self-assemble based on lab constraints since this will require microscopes and bench time. Groups of 2-4 are desirable.
- Ask the students to read the Scene- A Curator’s Dilemma out loud. Have the students fill out the box chart and ask the students to highlight unfamiliar vocabulary. Have the students look at the example of condition reports for textiles (below in resources).
- Discuss briefly their charts.
- Begin the Lab I-A&B with a demonstration of how to carry & clean the microscope & slides.
  - a. Demonstrate the parts of the microscope.
  - b. List the steps in operation of the scope on the board.
  - c. Start with the lowest power, clicked in.
  - d. Place slide on stage with clips on slide.
  - e. Check location of iris diaphragm and adjustment knobs taking notice of which direction increases and decreases working distance.
  - f. Look through ocular, move slide by touching the left or right edge, then place the specimen in the center of vision and use coarse adjustment to focus. If the specimen “goes away, just slowly turn the coarse adjustment knob in the other direction.
  - g. Finally, use fine adjustment to get the sharpest image to sketch.
  - h. Try rotating the nosepiece to increase magnification.
  - i. Now, using only FINE adjustment focus the image.
  - j. Take note of the numbers on the objective lens.
- Demonstrate the making of a wet mount, using letter e and hair
- Announce you will circulate clockwise to aid the students in their work. Observe the participation level of each student and record inactive students with a minus.
- Allow the students to make sketches and slides for the remaining time.
  - a. If students complete their required sketches have different types of animal hair and thread to observe.
  - b. Allow students to photograph the image seen thought the eyepiece using a cellphone to allow improvement of sketches at home.
- Announce clean up instructions and homework assignment.
Day 2:

- The second day of lab should be split into 2 sessions allowing for everyone to complete the 4 different types of fiber sketches and flame tests.
- Make sure you stop all students after 20 minutes to demonstrate the safety procedures for the burn test.
  - a. Write directions on the board.
  - b. Prepare fibers by placing one of each in a petri dish (avoid flammable materials)
  - c. Ready the metal forceps
  - d. Light the candle
  - e. Carefully hold fiber 10 cm from the flame and move closer
- Announce clean up instructions and homework.

Day 3:

- The beginning of the third day should be used to turn in lab work and analysis questions. Collect and mark the time they turn in their lab work.
- Connecting the “Curator’s Dilemma to the science lab:
  - a. Distribute large pieces of newsprint and have the group flowchart the fiber analysis for fabric identification.
  - b. Ask the students to brainstorm how this is related to the dilemma. Brainstorm why it would be important to know from what type of fibers a costume is made. Hints about why we wash in delicate and dry wool flat may help (ie shrinkage of different fibers).
- Homework
  - Ask the groups to brainstorm and research:
    - a. What types of fibers are used in garments? \(\rightarrow\) construct their ideas into a timeline of garments
    - b. Care of textiles and the role of a conservator \(\rightarrow\) create a pamphlet showing how they can care for their textiles, when to consult a conservator, and an example of what a textile conservator can do
Resources

Garment collections
http://www.metmuseum.org/collections/search-the-collections?
rpp=60&noqs=true&ao=on&ft=*&what=Costume&deptids=62&pg=1

History of garment production
http://en.wikipedia.org/wiki/History_of_clothing_and_textiles#

Background on fibers

Condition Reports for Textiles

Caring for Your Treasures
http://www.conservation-us.org/about-conservation/caring-for-your-treasures/textiles#.UuVYjLT0DJw

American Institute of Conservation
http://www.conservation-us.org

Podcast on Conservation of Garments
http://www.carlos.emory.edu/conservation/case-studies/ancient-american

Necessary Instructions and Forms for Lab

Found in “The Science behind Art Conservation” Manual and online at
http://www.carlos.emory.edu

Teacher’s Guide for Fiber Identification Lab 6
Student’s Guide for Fiber Identification Lab 6

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