

Thinking like a scientist - Mystery Box

Created by Michelle Tremel, Outreach Assistant, Teacher Candidate, University of Saskatchewan - Art and Science lesson

Summary

In small groups students will be given an enclosed box that is opaque. They will be asked to do a series of experiments to develop a hypothesis about what is inside the box. For the different experiments they may shake or tilt the box, as well as shining different types of light at the box. This lesson can be used to strengthen observation skills before drawing, because it encourages them to pay attention to detail. The idea behind this is that you can see different things with different light, much like a synchrotron. Once they have a hypothesis the students should draw what they believe is in the box. In the second class students can make their own assemblage to put in the box.

Pan-Canadian Objectives

Science Grade	Skills	ATTITUDES
10-12	212-all, 213-1, 213-2, 214-3, 214-12, 215-1, 215-2, 215-5, 215-6	436, 439, 440, 442, 444, 445
7-9	208-all, 209-1, 209-4, 209-6, 210-11, 211-all	422, 423, 425, 426, 428, 430, 431

Objectives

1. The students will think make careful observations during active involvement in constructing knowledge and discuss their observations with others while analyzing and investigating the contents of the box.
2. The students will be able to examine sources of ideas for art-making and generate ideas for personal expression while creating their own assemblage.
3. The students will be able to examine the similarities between the processes involved in scientific research and art.

Materials

- ✿ Translucent/Opaque boxes – Tupperware, box made of wax paper or some other substance – not clear but can see light shining through
- ✿ Various light sources (flash lights, projector, black light, sunlight, laser, dark)
- ✿ 1-2 Objects to put inside box (It will be too hard if there are more)
- ✿ Drawing materials (paper, pens, markers)
- ✿ Materials for students to make their own assemblage – see below
- ✿ Art Mystery Box Instructions for Students – see attached

Suggested materials for mystery objects

Materials that are shiny (glitter, buttons), glow in the dark paint, reflectors, glow beads, plastersine (white), anything that may react with light, and other available building

materials. Teacher's Note: Have the boxes tightly sealed and numbered so they can be passed around, and they can reference the number when the boxes are opened at the end.

Activity

Class 1 - 1 hour

1. Give each group of students a box with the instructions.
2. Have stations set up for students to go around. Each station should have a different light source or another type of prompt to help them develop their experiments. (i.e. texture station, black light station, sound station, etc.)
3. Have the students make predictions about what is inside the box and try to develop and carry out experiments to test their predictions.
4. Get the students to draw what they think they will see when the box is opened. Encourage them to make detailed observations.
5. Rotate the boxes to the next group, and repeat steps 1-4.
6. At the end of the class open the boxes.
7. Get the students to place their observations and drawings by each object, and have everyone walk around and look at them
8. Have a discussion about what is in them and the scientific research process that the students had to go through. They are thinking like scientists. Talk about how important it is to have detailed observations to be accurate.

Class 2 - 1 hour

1. Provide the students with a variety of materials and encourage them to bring supplies from home to make their own assemblage (Sculpture consisting of many objects and materials which have been put together) to go inside a box.
2. Give them time to make an assemblage. Encourage students to keep their objects simple, and make things that will give away some of their traits.
3. Have students put their object in a box and give it to a classmate who has not seen their assemblage. Let their classmate make a drawing using the same procedure.
4. Repeat process in class 1 if time permits.

Culminating Activity

Everyone gets to reveal their object. Discussion about how they did their investigations.

Ask probing questions: How is this different from what a scientist would do? How did they make their assemblage? What were they trying to do?

Tell them about the Canadian Light Source and how they use very powerful light, and all different types of light to see the different structure of things. Have a discussion about science. How and why are experiments done?

References

The Mystery Box. Center for Inquiry-Based Learning Dept. of Biology, Duke University
Retrieved on: July 3rd, 2007.

http://www.biology.duke.edu/cibl/exercises/mystery_box.htm

Saul, W, Reardon, J, Pearce, C, Dieckman, D, & Neutze, D. (2002). *Science Workshop: Reading, Writing, and Thinking like a Scientist*. Second Edition. Heinemann, Portsmouth, NH.

