



Scientific Illustrations: Art/Science Lesson Plan

Delaney Patterson, MFA in Arts Administration Student at Southern Utah University
Provided by the Garth & Jerri Frehner Museum of Natural History
Appropriate for Middle and High School
Estimated Duration: 4-5 One-Hour Class Periods (Including Field Trip)

Overview: This lesson incorporates art and science by having students draw from specimens under microscopes and magnifying glasses in order to see the details, structures, and patterns that are otherwise missed. Students will also learn how to use a dichotomous key and identify their specimen.

Objectives:

1. **Create** (Creating/Bloom's) a realistic observational drawing of the specimen by using a microscope or magnifying glass.
2. **Illustrate** (Applying/Bloom's) at least 4 different views of the specimen.
3. **Write** (Creating/Bloom's) notes detailing the specimen, including measurements, unusual details, and hypotheses about its species.
4. **Compare/Contrast** (Analyzing/Bloom's) specimens with other students during observation and critique.
5. **Identify** (Understanding/Bloom's) the specimen using a dichotomous key or other research methods.

Resources: **Internet sites:**

<http://scientificillustration.tumblr.com/>

http://www.mnh.si.edu/exhibits/losing_paradise/ScientificIllustration.html

Books, can be found on Amazon:

Brady, Irene. *Illustrating Nature: Right-brain Art in a Left-brain World*. Talent, OR: Nature Works, 2004. Print.

Leslie, Clare Walker., and Charles Edmund Roth. *Keeping a Nature Journal: Discover a Whole New Way of Seeing the World around You*. North Adams, MA: Storey Pub., 2003. Print.

Zim, Herbert S., Clarence Cottam, James Gordon Irving, and Susan Simon. *Insects: A Guide to Familiar American Insects*. New York: St. Martin's, 2001. Print.

***Golden Guide* books from St. Martin's Press has many different topics such as birds, trees, pond life, etc. that can be used, all found on Amazon

Materials: 9x12 (or larger) paper
Drawing materials
Handheld magnifying glasses
Microscopes
Plant, insect, or animal specimens to be viewed, preferably living and easily identifiable
Golden Guide books from St. Martin's Press (insects, pond life, wildflowers, trees, plants, whatever may be relevant to your specimens)

Procedure:

Introduction:

1. Show students *Golden Guide* books and an example of the dichotomous key found in the books. This key is a guide that the students can use to help identify their specimen. Scientists create and use these keys to help identify all sorts of animals and living creatures.

Demonstration:

1. Show examples and different ways students may illustrate their specimen, particularly the patterns and details. There should be multiple illustrations (at least 4) on the page, possibly with windows of close-ups with detail, different views, etc. Demonstrate how to properly use microscopes, petri dishes, and slides, especially if they haven't used them before.

Work Period:

1. The first session will be for the field trip to the Garth & Jerri Frehner Museum and Braithwaite Fine Arts Gallery (if your class is able to go). At the Braithwaite, there are a few pieces inspired by nature and science, and are similar to observation drawings. Look specifically at these and talk about them with your class.
2. The second session will include the introduction and demonstration. After this, students can begin viewing the microscopes and making their observational drawings/notes. If you allow, students may be able to use the cameras on their phones to get pictures of the specimen through the microscope. It is tricky to get the right angle, but the photos do work and can help if they don't finish their

- illustrations in time. Walk around the room and assist as needed, particularly in identifying the specimens.
3. If necessary, students can continue illustrating and writing about their specimens for a third session.

Closure:

1. Have a short critique of the students' finished drawings, and see if their classifications were correct. Were there a variety of different creatures or plants? How did people draw them differently or show different views?
2. Students will fill out their self-assessment rubric and turn it in.

Vocabulary: Scientific Illustration, Observation, Microscope, Slide, Petri Dish, Invertebrate, Vertebrate, Insect, Plant, Dichotomous Key, Classification, Species, Family, Hypothesis

Community Involvement: Field trip to Garth & Jerri Frehner Museum of Natural History and "ABC: Assemblage, Book Arts, & Collage" show at Braithwaite Gallery on SUU campus, Guest speaker by biology professor, SUU biology student.

Integrations with Other Subjects in Utah Core: Life and Environmental Science, Biology, Math (Measurements, Patterns, Geometry), Visual Art, and Literacy (Reading, Writing, Speaking, Listening)

Incorporation of Technology: Students will use microscopes to see their specimens magnified. Photo references can be printed out for those who need help finishing their illustrations.

Accommodations for Students with Special Needs:

1. For special needs students, extra assistance and modified materials will be given. If students finish early they can help those who need more time. For students with hearing difficulties I will speak clearly and loudly and will provide written instructions. Visually impaired students can sit closer to the demonstration or screen if needed.
2. For ESL students, provide classroom signage or a worksheet with the terms and ideas in their native language.
3. For gifted and talented students, extensions or the ability to work at home may be given so they can spend more time elaborating their drawings or notes. They may also help others identify their insects or plants.

Extensions:

1. Can these be displayed somewhere?
2. Use photographs instead of drawings.
3. Partnership between art and science classes.
4. Rather than buying the books, you can get specimens that you already know the identity of and create your own dichotomous key.

Reflective Questions:

1. Did I forget any materials, resources, or steps that would have helped the students create a more successful piece?
2. How can I improve this lesson?
3. Note to Self: Photograph student work.
4. What did students like or dislike during this project?

National Visual Arts Standards Met:

- 6th Grade: VA:Cr1.2.6a Formulate an artistic investigation of personally relevant content for creating art.
 - Achieved through learning about and investigating their specimen by looking at its details and illustrating them in a variety of ways.
- 7th Grade: VA:Cr2.3.7a Apply visual organizational strategies to design and produce a work of art, design, or media that clearly communicates information or ideas.
 - Achieved through creating observational drawings with notated descriptions and ideas of their specimen.
- 8th Grade: VA:Cr2.3.8a Select, organize, and design images and words to make visually clear and compelling presentations.
 - Achieved through creating observational drawings with notated descriptions and ideas of their specimen. Composition and visual information strategies can be used.
- HS Accomplished: VA:Cn10.1.IIa Utilize inquiry methods of observation, research, and experimentation to explore unfamiliar subjects through art-making.
 - Achieved through observing, researching, and identifying the specimens that are illustrated.

Utah Core Science Standards Met:

- 6th Grade: Standard 5 Objective 1: Observe and summarize information about microorganisms
 - Achieved through observing specimens under the microscope and presenting visual and written information about the subject.
- 7th Grade: Standard 5 Objective 1: Classify based on observable properties.
 - Achieved through classifying their specimens by looking through microscopes and comparing to a dichotomous key.
- 8th Grade: Standard 2 Objective 2: Generalize the dependent relationships between organisms.
 - Achieved through observing different specimens and establishing whether they are prey or predator. Depends on the specimens used in the lesson.
- Biology: Standard 5 Objective 3: Classify organisms into a hierarchy of groups based on similarities that reflect their evolutionary relationships.
 - Achieved through classifying their specimens using a dichotomous key.

**Scientific Illustrations
Student Self-Assessment Rubric**

Student Name: _____

Date: _____

Please evaluate your success in the following areas, with “A” being your best effort, and “D/F” indicating that you did not make any attempt in that area:

I created a realistic drawing from observing the specimen with the microscope/magnifying glass.	A	B	C	D/F
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I drew at least 4 views of the specimen.	A	B	C	D/F
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I included notes in my drawing about the specimen’s details, measurements, etc.	A	B	C	D/F
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I did my best to identify the specimen by using a dichotomous key.	A	B	C	D/F
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I presented my work and actively participated during critique.	A	B	C	D/F
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Overall, I think I earned the following grade on this project.	A	B	C	D/F
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Student Reflection:

Signature of Student: _____

Signature of Teacher: _____

Teacher’s Comments: