Design Topic: Environmental Interconnectedness Subject(s) Science, Dance, History Grade(s) 4/5 Designer(s) Jodi Delaney

Stage 1—Desired Results

Unit Title: Rachel Carson teaches Environmental Interconnectedness

Established Goals:

Science: Next Generation Science Standards:

5-PS3-1. Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun. [Clarification Statement: Examples of models could include diagrams, and flow charts.]

5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. [Clarification Statement: Emphasis is on the idea that matter that is not food (air, water, decomposed materials in soil) is changed by plants into matter that is food. Examples of systems could include organisms, ecosystems, and the Earth.] [Assessment Boundary: Assessment does not include molecular explanations.]

History: National History Standards:

Major discoveries in science and technology, their social and economic effects, and the scientists and inventors responsible for them.

Standard 8A: The student understands the development of technological innovations, the major scientists and inventors associated with them and their social and economic effects.

English Language Arts CCSS:

CCSS.ELA-Literacy.RL.5.6 Describe how a narrator's or speaker's point of view influences how events are described.

Arts; Dance National Standards: Grade 5 DA:Cr2.1.5

a. Manipulate or modify a variety of choreographic devices to expand choreographic possibilities and develop a main idea. Explain reasons for movement choices.

b. Develop a dance study by selecting a specific movement vocabulary to communicate a main idea. Discuss how the dance communicates non-verbally.

Understandings: Students will understand that…

Scientists develop their understandings based on observation and research.
New research may contradict or replace older information.
All living things are interconnected, in a 'web' that gets its initial energy from the Sun

Students will know: How a food chain/web works, how scientific understandings are developed, and the importance of scientists communicating their findings.

Essential Questions:

How important are the relationships between living things?
How do we know what we know about living things?
What would happen if parts of the web are removed (extinction)?

Students will be able to:

Explain how living things are interconnected ('food chain/web').
Demonstrate how energy from the sun is transferred through the web.
Explain the role of scientists in researching and informing the public of new findings.

Stage 2—Assessment Evidence

Performance Tasks:

Students will engage in conversation with 'Rachel Carson', demonstrating speaking and listening skills.
Students will work with the modified Jenga game to demonstrate potential food chain collapse and make observations.
Students will demonstrate an understanding of the lesson by developing dances in groups to communicate what they have learned.

Key Criteria:

Students understanding will be assessed based on the dances performed. They will already have background knowledge and practice in creating dances prior to this activity.

Other Evidence:

Students may also journal about this topic in their Science Journals, giving an additional mechanism for observing student learning.

Stage 3—Learning Plan

Materials: Modified Jenga game (see appendix) and a sheet of paper for the base labeled 'The Sun'
Optional: Rachel Carson costume and a copy of Silent Spring
http://timelinecostumes.blogspot.com/2014/10/1962-rachel-carson.html

Summary of Learning Activities:

The teacher, dressed as Rachel Carson and acting in character, will introduce her new book to students. It is called Silent Spring (1962). Ask students what they think might cause a 'spring' to be 'silent'. She is very concerned at the popular use of powerful chemicals in the environment and what that is doing to the smallest living creatures that we all depend on for survival.

Rachel will explain that many people are angry with her for what she has to say about the environment (if they are surprised at this, you can remind them that it is the 1960s after all, and people are still arguing about climate change etc. today). She will explain it to these young scientists using a modified Jenga game. All the pieces have been labeled with something from the living environment

(there are only 54 blocks, so not everything in an ecosystem is included, see appendix for a suggested list). The stack is generally set up in a hierarchy with a sheet of paper that says 'Sun' for the base, then decomposers, producers, and consumers. 'Human' goes on top (offering an opportunity to show that the environment can survive just fine without humans living there, but humans rely on the environment for our existence).

Students will take turns pulling out Jenga blocks until the entire food chain/web collapses. Normally, you would place the blocks on top as they're removed, but explain to students that in 'Extinction Jenga', once the species is extinct, it is gone forever, and therefore the block gets set aside and not added to the top. Ask students to explain what happens in the environment if those particular living things are removed and why they might disappear. Note that this is a model explaining how energy gets from the sun to humans. If the web collapses, then we starve! Rachel will explain that this is the huge problem she is very concerned about—humans destroying the environment we rely on to survive. Many people, including some other scientists, were upset with Rachel and not willing to listen to what she had to say.

The young scientists will now create something to help Rachel explain. She has already used words in her book, so we will convey this information without words to help people understand in another way, especially since some are critical of her words and not listening. We will create dances to share this information and 'speak for the environment'. Break students into groups of about 4 or 5. Each group will have each member choreograph a part of the dance, using abstracted movements to represent ideas (as opposed to direct pantomime). Ask students to do a quick brainstorm of ideas they are trying to convey. Make sure you include terms like 'balance' and 'interconnected' that will help inspire movement.

If you are performing inside: Provide students with background music while they work together, and then use that same music for their performances. Better option: go outside to choreograph and perform. If you go outside, you will get to utilize 'site-specific choreography'. This is when you use physical features of the performance space as an integral part of the choreography; you could not perform this dance in another location as the choreography is designed to use the space. If outside, encourage students to use parts of nature to provide the music/sounds. This gives you another opportunity to explore the outside environment and creatively make your own musical accompaniment. In this manner, the environment is 'speaking for itself'.

Students will take turns performing their Food Web dances to show what they know about the interconnectedness of all living things in an environment. They should be given an opportunity to explain their dance and its meaning after the performance.

Connection: At the end of the lesson, Rachel will thank them for their hard work and expertise. She will encourage them to spread the word and inform others about what they can do to ensure our food web stays healthy. Tie this to current events and the bee population, including efforts to protect hives from chemical devastation as they are important pollinators (and the majority of human foods are in some way impacted by bees).

Students may journal or create an action plan for what they would like to do to help in their own lives.

Appendix:

Food Chain/Web List for Jenga Pieces, focusing on a general Northwestern North American ecosystem

1. Bacteria
2. Algae
3. Grass
4. Wheat
5. Barley
6. Fungi/Mycelium
7. Flower Nectar
8. Douglas Fir Tree
9. Aspen Tree
10. Ponderosa Pine Tree
11. Carrots
12. Corn
13. Dandelions
14. Decaying plants
15. Caddis Fly
16. Mayfly
17. Beetle
18. Spider
19. Mosquitos
20. Moth
21. Rabbit
22. Butterfly
23. Hummingbird
24. Vole
25. Snake
26. Snail
27. Frog
28. Centipede
29. Worm
30. Antelope
31. Deer
32. Prairie Dog
33. Cow
34. Chicken
35. Horse
36. Sparrow
37. Mouse
38. Rat
39. Gopher
40. Hawk
41. Cliff Swallow
42. Meadowlark
43. Badger
44. Beaver
45. Grizzly Bear
46. Black Bear
47. Fox
48. Coyote
49. Wolf
50. Eagle
51. Robin
52. Vulture
53. Owl
54. Human