Soil: Keeping a Low Profile

1. Module format:

a. Background

**i. Learning Objectives:**

List the components that make up soil and discuss soil forming factors.

Explain the difference between organic and mineral soil.

Identify different horizons in the soil profile.

**ii. Topics of module**

What is soil?

How is it formed?

Organic vs. mineral soil

What is a soil profile and what can we learn from it?

**iii. Why is this module interesting?**

This module lets students get their hands dirty! It exposes students to soil as something other than ‘dirt’ or ‘mud’. Students will learn about the value of soil and the processes and properties that make it awesome.

1. Materials and methods

b. Materials

1. Rocks (~2/person; I used Premium River Pebbles)
2. Sand (~1/4 cup per person)
3. Potting soil (~1/4 cup per person)
4. 7 oz. **clear** plastic cups (2/person)
5. Popsicle sticks (1/person)
6. Flower seeds (3+ per person)
7. Small mailing labels (3/person)
8. Scoops/measuring cups (at least 4, but more is better)

c. Procedure

1. **Preparing Materials *(****complete before classroom visit)*
2. Use a sharp object to poke small holes in the bottom of half of the cups (i.e. 1/person).
3. In the remaining cups (i.e. 1/person), make two horizontal slits on opposite sides of each cup approximately 1 cm from the bottom of the cup.
4. Insert one popsicle stick into the slits in the second cup. This cup will catch any water that drains from the upper cup when students water their plants. The popsicle stick will hold the upper cup out of excess water, so they don’t drown their plants.
5. Print/write on each label one of the following: ‘organic’, ‘mineral’, or ‘parent material’. There should be one of each label for each student.
6. **Pre-Assessment**

1. How many people have been outside today? How many have actually thought about soil? *(all have been outside, but typically very few have thought about soil; goal is to change this)*

ii. **Participatory Learning**

Students will get to build their own ‘soil profile’ and grow a plant. For the purpose of this exercise, the rocks represent parent material, the sand represents mineral soil, and the potting soil represents organic soil.

1. *First, discuss module topics (I used a PowerPoint presentation) as kids get quite excited about the activity and it will be difficult to regain their attention for a lesson*.
2. Have students place cup with holes into cup with popsicle stick *(check to make sure everyone has done this correctly)*
3. Have students place ~2 rocks into the upper cup *(first ask the students to guess which of the 3 materials go in first – they can usually make the connection and guess rocks)*
4. Have students take turns using the measuring cups to scoop ~1/4 cup sand into upper cup *(again, ask students which material should be placed next in profile. Can also have students discuss any visual or textural differences between sand and potting soil)*
5. Have students take turns using the measuring cups to scoop ~1/4 cup potting soil into upper cup
6. Tell students to make a shallow well in the middle of the organic horizon using their finger
7. Place a few seeds into each cup and have students cover them with soil *(distribute the seeds yourself as they are small and students will lose them)*
8. Remind students of watering and light requirements for chosen species.
9. *Discuss with teacher beforehand to decide whether students will take plants home or leave in the classroom.*

iii. **Post-Test**

1. Have students place labels onto cup at corresponding ‘horizon’ in their soil profile. *Encourage students to try their best to remember which is which, but remind them they can discuss with friends or ask for help.*
2. Have students write their name on one of the labels.

iv. **Summary**

1. Discuss how soil scientists use soil profile to make inferences about soil. Discuss the value of knowing soil texture (nutrient and water retention, etc.). Helpful to bring in ecosystem services and real world examples (e.g. agriculture, water purification, etc.)

d. Make it your own

i. One way to advance the module is:

1. Have students identify various ecosystem services provided by soil by circling them in a diagram and/or have students perform a ‘feel’ test to determine mineral soil texture.

ii. One way to adjust module for younger groups is:

1. Have students draw/colour a soil profile. Alternatively, students can make a construction paper soil ecosystem or profile by cutting and taping the corners of brown construction paper into an open top box. Use markers, pompoms, googly eyes, and pipecleaners to make roots, fungi, and soil fauna to place in ‘soil’.