Reactions to Changing Environments
2nd or 3rd Grade

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Benchmark:

SLC 17: Students will explain how plants react to changes in weather conditions (e.g. seasons, temperature, drought, food availability).

Purpose:

This lesson is designed to develop in students an appreciation for how common plants react to seasons and changes in the weather, and help students understand the way plants react to specific stimuli such as water, light, and heat.

Materials:

- Pictures of plants during different seasons.
- Plants in individual pots (~5-6)
- Hot Light
- Cold place to keep plants
- Water
- Box

Day 1:

Initial Demonstration:

Demonstrator should split the class into groups of ~4-5 students per group. Demonstrator should give each group a picture involving a plant interacting with its surroundings, i.e. trees in winter, grass during a drought, etc…Ask the students to make observations about the weather in the picture.

Target Observations:

- It looks snowy, cold (in the picture)
- It looks hot
- Etc…

Follow-Up Demonstration:

Demonstrator should now have the groups make observations about the pictures, this time making observations of the plants.

Target Observations (respectively):

- The trees have snow on them; they don't have leaves.
- The grass is brown
- Etc…

Discussion:

Demonstrator should discuss with the students as a whole about the differences seen in the pictures: what does it look like plants do when their surroundings (not synonymous with weather, but almost) change?

Target Model:
-*Plants change (example: look different) with their surroundings*

Procedure:

Demonstrator asks the students what types of surroundings could change the plants. What might happen to plants in those surroundings? What surroundings are good for plants?

Target Surroundings:
-Plants in the cold <-> Test: Put plant in snow or freezer (with light)
-Plants in the heat <-> Test: Put plant under a heat lamp
-Plants that are flooded <-> Test: Water a plant a lot
-Plants that are shaded <-> Test: Put plant under a box
-Plants that are just right <-> Test: Give plant a moderate amount of water and light

Testing: Discuss with students the importance of only changing one surrounding at a time compared to the Goldilocks plant (everything just right): say a student put the plant in the snow and flooded it with water, after which the plant died. What killed it, the snow (cold) or the extra water? We can't know. To figure out what to change, compare everything to the Goldilocks plant: if you put a plant in the snow, you have to give it as much water and light (as good as possible) as the Goldilocks plant is getting; if you give a plant a lot of water, you have to keep it at the same temperature and give it the same light.

After this discussion, have the students split back into their groups, and assign every group an experiment of surroundings to take care of. This will be their experiment, and they need to follow the experiment directions given to them for the next few days. If possible, reserve the Goldilocks plant for the teacher to take care of.

Ask the groups to make predictions of what they think their plants will look like. Have the students, over the next few days, take care of their experiments and make observations of their plant.

Day 2:

Procedure:

Have the students collect observations of their plants, and discuss them with the class.

Target Observations:

- The plant in the cold died.
- The plant under the light wilted and died.
- The plant that was flooded wilted.
- The plant under the box looked sick.
- The Goldilocks plant looked healthy.

Discussion:

Why did the plants that were in the cold, under the light, or flooded die? What do plants need to survive?
Target Responses:
-Light
-Air
-Water
-Heat

What would be a good "ideal" surrounding for these plants?
Target Response: An ideal surrounding would be the classroom: Some light, some air, some water, and some heat, but not too much of any of these.

Target Revised Model:
-Plants change (example: look different) with their surroundings
-*Plants need air, water, heat, and light to survive*
-*The best place to grow a plant is where there is some light, some air, some water, and some heat, but not too much*

Procedure:
Which of the plants tested have summer-like conditions? Which one had winter-like conditions? How do you think plants survive in winter/summer when they don't get a lot of the things they need? Demonstrator should now show students pictures of plants in extreme environments: desert, ocean plants, plants on the forest floor (i.e. don't get much light), plants on a mountain (cold and lack of air). How could plants survive in these places? How do these plants look different from the plants you used? Could these differences in the way they look be a result of their different environments? What do you think their "Goldilocks" surroundings would be? (I.e. could a cactus survive well next to a river?)

Target Observations:
- Plants survive in different seasons/climates by adapting: cacti don't need a lot of water, trees lose their leaves and "hibernate" during the winter, plants on the tops of mountains don't grow very big, etc…

Target Revised Model:
-Plants change (example: look different) with their surroundings
-Plants need air, water, heat, and light to survive
-The best place to grow a plant is where there is some light, some air, some water, and some heat, but not too much
-*Plants change with their surroundings so they can survive when they don't have "Goldilocks" conditions.*

Group 1: Cold Plant Your group will be in charge of the cold plant. First water your plant with 1 cup of water. Then, 1 member of your group will **go with a teacher** to take your plant outside. You will need to place it close to the window so you can see it. Give your plant 1 cup of water a day.	**Group 2:** Hot Plant Your group will be in charge of the hot plant. First water your plant with 1 cup of water. Then, place your plant on the taped "x" by the sink and **ask a teacher** how to turn on the lamp. Give your plant 1 cup of water a day.
Group 3: Flooded Plant Your group will be in charge of the flooded plant. First water your plant with 3 cups of water. Then, **ask a teacher** where your plant will be placed. Give your plant 3 cups of water a day.	**Group 4**: Plant In The Dark Your group will be in charge of the plant in the dark. First water your plant with 1 cup of water. Then, **ask a teacher** where your plant will be placed. Give your plant 1 cup of water a day.
Group 5: Goldilocks Plant Your group will be in charge of the Goldilocks Plant. First water your plant with 1 cup of water. Then, **ask a teacher** where your plant will be placed. Give your plant 1 cup of water a day.	

Observation Sheet

Group Name: _____

Predictions:	Observations: Day 1	Observations: Day 2
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
Observations: Day 3	**Observations: Day 4**	**Observations: Day 5**
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Observation Sheet

Group Name: _____

Predictions:	Observations: Day 1	Observations: Day 2
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
Observations: Day 3	**Observations: Day 4**	**Observations: Day 5**
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____