Education 254 Fall

Lesson 1 Plants Need Light to Survive

Sub-Driving Question: What does light have to offer plants?

Objective(s): LWBAT describe resources for plant growth.

LWBBAT explain their observations using background knowledge.

Grade(s): 4

Standards:

L.OL.E.1 Life Requirements- Organisms have basic needs, Animals and plants need air, water, and food. Plants also require light. Plants and animals use food as a source of energy and as a source of building material for growth and repair.

L.OL.04.15 Determine that plants required air, water, light and a source of energy and building material for growth and repair.

Background Knowledge:

Just like humans, plants need food too. Yet, they make their food through a process called photosynthesis. Photosynthesis is when plants are able to convert energy from sunlight into a simple sugar, glucose. This occurs as carbon dioxide and water are taken in, glucose is produced, and oxygen and water are given off. The chloroplasts, small green-pigmented units within a cell containing chlorophyll, are responsible for the absorption of light that drives photosynthesis in plants. Glucose is used to produce other sugars and starch that in turn, through cellular aerobic respiration, may use some of the oxygen produced to form CO2, water, and energy.

Materials: \*note some need to be prepared before class  
Spinach leaves (1 leaf per student)  
Sodium bicarbonate (Baking soda)- 1/8 of a teaspoon of baking soda in 300 ml of water  
Liquid Soap – 1 to two drops in the 300 ml  
Plastic syringe (10 cc or larger)—remove any needle!   
Hole punch   
Clear Plastic cups   
Timer   
Light source: Heat lamp \* Make sure students are carful around the heat lights as they are very, very hot!!  
Green Light Source: green pop bottles, clear bottles with green food coloring, green colored glass wine bottles, green party light (buy them at the grocery store)

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| **Prep** | It is assumed that the air photosynthesis lesson plan has already been completed.  Prepare at least 20 disks that have been “pumped down” (the oxygen has been drawn out of them).  Follow the steps on the previous lesson plan for how to accomplish this. |
| 3-3:10 | Background and Review  Sample students’ knowledge of why people need plants (include for oxygen if not up on the board), and why people are important for plants (include for carbon dioxide on the board). Include the above explanation of photosynthesis, except use sugars or starch instead of glucose. (questioning)  If need be illustrate how plants need and give off oxygen and that’s why they float as modeled in the previous lab.  If you have already done the previous air experiment begin to use guided questions to encourage students to think about how we can create a new experiment looking at the light aspect of photosynthesis |
| 3:10-3:15 | Show students the materials you have too look at light.   * Green bottles, blue light, white light, along with the rest of the supplies listed above   Ask them to think without raising their hands quite yet on how to use the materials in order to create an experiment to observe how light effects photosynthesis. (Inquiry)  Ask the students to question if the change in color of light would make a difference in the production of oxygen during photosynthesis  -Once you open for suggestions lead students to believe that they came up with the idea to put the green light vs. the white light. Other variations on the type of experiments can be made depending on your time and materials. |
| 3:15-3:30 | Students Begin Experiment:  \*put 10 leaf disks in one clear cup under the white light  \*put 10 leaf disks in the other clear cup and place it under the green light  \*begin timing how many minutes it takes for the white light disks to rise vs. the green light disks. On the other lesson plans there is a print out sheet that you can give the students. It usually takes a good 20 minutes for photosynthesis to begin taking place.  Because the wait is so long other work can be accomplished during this time while a designated individual with watch the disks  A possible activity while the students wait is attached to the last page of the air lesson plan. Just have the students make the appropriate arrows and connections to the various items. |
| 3:30-3:45 | Once 20-25 minutes are up have the students fill out the same question sheet as on the air lesson plan.  Stop and Ask Some Questions: \*Hand out Worksheet Asking: -Tell me what you observed (priority to evidence) -Explain to me why you think this happened (explanations) -What important resource did we observe today? Why it important to plant life?  -Are there any other important resources needed for plant life?  -Does it make sense that air is included in that group of resources? Why? (evaluate explanations) |
| 3:55-4 | Discuss as a group why we think the differences in light colors might cause a change the rate at which photosynthesis takes place. It is due to the fact that the green chlorophyll pigments is emitting the only the green color when white light is on them. White light contains all the colors and electrons the plants need all the other colors of light except for the green. So if you put only green light on them, the plants cannot photosynthesize with that color; they need all the other colors light.  Because this answer is very detailed, it is not important that you explain it to them, instead listen to their hypotheses from their observations and encourage them to read more about it if they are truly interested in the answer. (communicate and justify) |
| Sources:  American Forest Foundation, 2007. Project Learning Tree Pre K-8 Environmental Education Activity Guide. Washington , D.C.<www.plt.org>  Williamson, B., 2008. The Floating Leaf Disk Assay for Investigating Photosynthesis. <http://www.elbiology.com/labtools/Leafdisk.html> | |