

STEAM Education & Leadership Workshops

Student Activity Lesson Plan - Roots of Survival: How Plants Thrive and Sustain Life

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Age range

6 - 10 years old

Learning objectives

- Identify and describe the key needs of plants, including air, water, sunlight, heat, micronutrients, and macronutrients.
- Understand the role of plants in ecosystems as producers through photosynthesis and their dependence on these factors for growth and survival.
- Conduct experiments and analyze data to conclude plant needs and optimal conditions for growth.
- Work in teams to speak about the results of their plant growth experiments.
- Explore the effects of climate change on plant health, nutrient cycles, water availability, and temperature changes.
- Design or suggest project ideas in their community to improve the connection of people with plants.

Structure of the lesson

- Introduction to plants as living organisms
- Experimentation
- Team reflection and conclusions

Duration

100 Minutes

Note to Educators

By understanding and protecting plants, we not only support ecosystems but also safeguard our own well-being and the future of life on Earth.

- Plants are living organisms that produce their own food through **photosynthesis**, a process where they use sunlight, water, and carbon dioxide to create energy in the form of glucose. To thrive, plants rely on essential resources: **air** (carbon dioxide), **water**, **sunlight**, **heat**, and nutrients, including **micronutrients** (like iron and zinc) and **macronutrients** (like nitrogen, phosphorus, and potassium).
- In ecosystems, plants play a critical role as **producers**, forming the base of the food chain. They convert solar energy into chemical energy, providing sustenance for herbivores, which in turn support predators. Plants also produce oxygen, a byproduct of photosynthesis, making life possible for most organisms on Earth.
- For humans, plants are indispensable. They provide **food, medicine, clothing fibers, and building materials**, and they regulate the climate by absorbing carbon dioxide and releasing oxygen. Their roots stabilize soil, preventing erosion, while forests act as carbon sinks, helping to mitigate climate change.

Timing	Facilitator's actions	Students outcomes	Technical notes
0-5 min	Through questions and answers from the children, we conclude that it requires certain conditions in order to live.	After the brainstorming session, we summarize the plant's needs and write them on paper slips: Air, Water, Light, Heat, Soil, and Minerals.	We need a plant or more in front of us, pen, paper
5-15 min	Each group is assigned a different condition: <ol style="list-style-type: none"> One group places their seedlings in a dark place. The second group places theirs in a cold place. The third group leaves theirs in a location but does not water it. The fourth group places their plants in an environment where they receive water, light, and heat. (Air will be present in all cases.) <p>We also provide each group with an observation sheet.</p>	The groups add some soil, plant 3-4 seeds (such as greens or beans plants that grow quickly), and water them. <u>After three days, the four groups gather at the table with their germinated seeds and observation sheets.</u>	4 pots or cups, soil, box, water, seeds of radish, beans.
Ongoing – for a week	We remind children to observe their seeds germinate and write it down in their observation sheets as scientists normally do.	Over the course of a week (or longer), the children record how their plants behave, writing and drawing their observations. We can also take pictures and print them at the end of the activity.	
15-45 min	We meet all together to show the status of our experiments, collect data on our observation sheets, and photos, and discuss our conclusions.	Children communicate their results to their peers and give a presentation of their collected documented data.	Their pots, observation sheets, photos
45-30 min	The teacher introduces the concept of photosynthesis .	Children understand that the air, light, heat, and water are used by the plant to make food and other elements. They will be able to identify the components of Photosynthesis and explain it.	Projector, PPT, worksheets
30-40 min	Experiment- Minerals We divide children into 6 groups. Each group has one plant, one jar, distilled water, and according to the case, minerals or mix.	Children have their observation sheets, and their materials prepared on the table. Group 1 and 2 will put their plant in the distilled water, and cover the jar with black paper so that sun doesn't get to the roots. Group 3 – mixes 1 tbsp in 500 ml of distilled water Group 4 – mixes a tbsp of potassium phosphate in 500 ml of distilled water Group 5 – one tbsp of calcium nitrate Group 6 – one tbsp of magnesium sulfate	6 seedlings (10-20 cm high) of a tomato plant, 6 jars, black paper, distilled water, potassium, calcium, magnesium, flower mineral mix
40-50 min	After observing and recording the plants, we meet with the students after 2 weeks to discuss the results and photos.	Children should see what is the effect of having or not having these elements. We can repeat the experiment with less or more of those minerals, and combine some of them according to our findings on the internet. They should also see what each element does to the plant. We can all make a poster of our experiment.	Our experiments, flipchart paper and markers or laptops, tablets.
50-70 min	The teachers observe how students work and intervene when necessary.	The groups make a poster and then put them all together in one.	
70-100 min	<ol style="list-style-type: none"> The teacher introduces the concept of macronutrients and micronutrients. Now that they know what photosynthesis helps plants make food and nutrients help them 	<ol style="list-style-type: none"> Children absorb the information, process it and ask questions, discuss it. What problems related to plants do we have in our community? – brainstorm Let's pick two and divide them into two 	<p>Projector, PPT, worksheets</p> <p>Flipchart, marker, laptop, tablets, books</p>

	<p>grow, let's see the ecological implications. How do we find problems in our community related to plants and how can we solve them?</p>	<p>groups.</p> <ol style="list-style-type: none"> 4. Brainstorm solutions. 5. What essential questions arise and what do we need to research? 6. Let's meet to establish a solution and make a plan. 7. Implementation of the plan follows, feedback, and we implement feedback. 	
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