

Lesson Plan in Japan (Example)

Function of Leaf in Plant (8) To examine photosynthesis by an experiment.

Purpose of Overall Unit lesson
By examining a structure and function of leave in plant, students will know the difference between animal and plants and deepen their understanding about two big categories in a living thing. By knowing about photosynthesis that is an unique function of plants, students will understand a symbiotic relationship between animal and plants and raise awareness on environmental issue.

Overall Design of Unit “Function of Leaf in Plant” in Japan

Design		No. of Lesson
Structure of Leaf	Observation of the Epidermal (surface of a leaf)	1
	Observation of the section of a leaf	2
Function of Transpiration of Leaf	Observation of vapor from a leaf	3
	Observation of the section of a stem and Experiment on a trachea	4
	Comparative experiment about transpiration	5
Function of Breathing of Leaf	Experiment on confirming of breathing	6
Photosynthesis	Review of starch reaction with Iodine Pre-experiment (experiment on a Teacher’s table, to confirm a leaf condition of “without starch”)	7
	Experiment on starch reaction with Iodine and confirmation on generation of photosynthesis	8
Photosynthesis and Breathing	Comparative Experiment	9
	Relationship between Photosynthesis and Breathing, Responsibility of Plants	10
Spare time	Jump	(11)

Purpose of today’s lesson	
Scientific Operational Literacy	Students can design a comparative experiment. Students can record the result of experiments.
Scientific Prediction (Hypothetical) Literacy	Students can guess the necessary condition of photosynthesis. Students can guess the relationship between chlorophyll and photosynthesis.
Scientific Creative Literacy	Students can think creatively about alternative hypothesis or experiments by using the results of the experiment.
Scientific Activity Literacy	Students can implement the experiment collaboratively with each responsibility.
What to Achieve in the Lesson: By observing the photosynthesis of leaves with sunlight and without sunlight, students can determine where the photosynthesis takes place and what is necessary for photosynthesis. And students can explain about photosynthesis with their own wording/expression.	

Preparation of today’s lesson

- 4 students in 1 group
- In the last lesson, leave the potted plants on which are covered by aluminum foil. (For security, the model teacher also prepares some leaves (covered by aluminum foil).
- Experimental tools: Beakers (to boil), Ethanol, sticks(to mix), tweezers (to pick-up the leaves), laboratory dishes (to put the leaves and see the reaction, hopefully 8 dishes per group), Iodine, syringes (to put iodine on the leaves)

(50 minutes Class)

Activity	Estimated Students' Reaction	What to support, what to evaluate	Time
1. Divide into groups, take some leaves from outside. Tell students to pick-up 8 leaves each (ones under sun; ones with aluminum foil)	There might be some students groups who cannot pick-up 2 kinds.	The teacher lets them find out the difference with other groups and let them understand what the necessary condition is to compare. He/she praises them if they all understand the condition. (Operation)	0-10 min
2. Explain how to do the experiment by reviewing the result of pre-experiment in the last lesson. (The students already wrote the procedure on their notebook.)	There might be some students do not understand individually.	The teacher asks students to confirm the necessary equipments. (Operation) (Activity)	10-15 min.
3. Let students write down what they predict about the experiment.	It might be led by students who always lead.	The teacher tells to students that they do not have to reach to a same prediction in the group. (Prediction)	15-20 min.
4. [Experiment] Decolorize the softened leaf with hot ethanol. Put iodine and write down the results on their notebooks.	Some students might be only watching what other students are doing.	The teacher advises to take turns at putting iodine and let all students watch the results of the experiment. The teacher should be careful not to have students without participation. (Activity) (Operation)	20-35 min.
5. Let students write down what can be guessed from the actual result of the experiment.	There might be some students who cannot articulate their thinking.	The teacher tries to let them share their guess through dialogue between students in the group. (Prediction)	35-40 min.
6. Ask students whether they have any other things to examine. If no answer comes out, remind them the leaf "without starch" and let them discuss about "sun-set	There might be some students who cannot talk at all. Or there might be some groups only active students talk.	The teacher tries to pump out students' alternative hypothesis through their whispering/murmur. The teacher tries to connect between active students and	40-50 min.

time”.		passive students. (Creativity)	
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(55+@ minutes Class)

Activity	Estimated Students’ Reaction	What to support, what to evaluate	Time
1. Devide into groups, take some leaves from outside. Tell students to pick-up 8 leaves each (ones under sun; ones with aluminum foil)	There might be some students groups who cannot pick-up 2 kinds.	The teacher lets them find out the difference with other groups and let them understand what the necessary condition is to compare. He/she praises them if they all understand the condition. (Operation)	0-10 min
2. Explain how to do the experiment. Demonstrate with a leaf without sunlight.	There might be some students do not understand individually.	The teacher asks students to confirm the necessary equipments. (Operation) (Activity)	10-20 min.
3. Let students write down what they predict about the experiment.	It might be led by students who always lead.	The teacher tells to students that they do not have to reach to a same prediction in the group. (Prediction)	20-25 min.
4. [Experiment] Decolorize the softened leaf with hot ethanol. Put iodine and write down the results on their notebooks.	Some students might be only watching what other students are doing.	The teacher advises to take turns at putting iodine and let all students watch the results of the experiment. The teacher should be careful not to have students without participation. (Operation) (Activity)	25-40 min.
5. Let students write down what can be guessed from the actual result of the experiment.	There might be some students who cannot articulate their thinking.	The teacher tries to let them share their guess through dialogue between students in the group. (Prediction)	40-45 min.
6. Ask students whether they have any other things to examine. If no answer comes out, remind them the leaf “without starch” and let them discuss about “sun-set time”.	There might be some students who cannot talk at all. Or there might be some groups only active students talk.	The teacher tries to pump out students’ alternative hypothesis through their whispering/murmur. The teacher tries to connect between active students and passive students. (Creativity)	45-55 min.