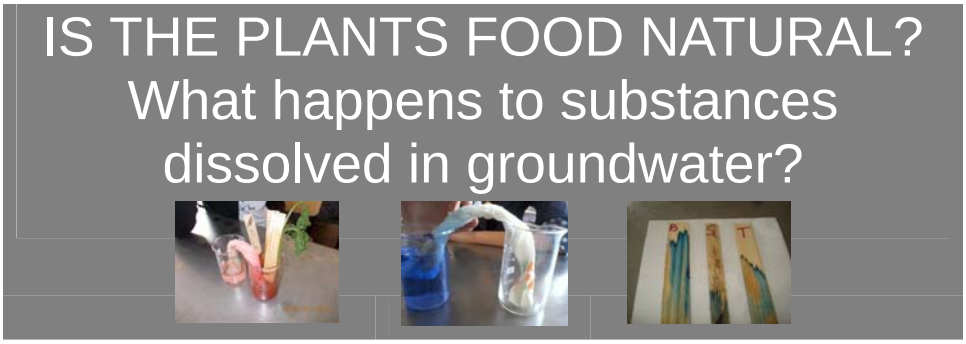
PROFILES IBSE Learning Module

Teaching Guide



Suggestions and learning outcomes:

This module allows the students to learn about:
a) Capillary phenomena, liquids structure, surface tension forces.
b) Asscending of the food in plants.
c) Applications of surface phenomena in Science area.

As main learning outcomes, there can be stipulated:

- Mastering the provided information and materials in terms of knowledge and skills;
- Transfering of the gained knowledge;
- Expressing the student personality.

At the end of the *first lesson*, it is expected that students will be able:

- To describe how plants meet their nutritional function (which involves experimental studies of photosynthesis, respiration and transpiration of plants);
- To explain the floating of the bodies denser than water because of the water film formed by water molecules at the surface, and the force that keeps those molecules united;
- To argue why water droplets are round;
- To present sufficiently resistant membranes created by the surface tension of the water.

At the end of the *second lesson*, it is expected that students will be able:

- To describe the phenomenon of capillarity, phenomenon who allows plants to absorb water from the soil through the roots and thus in the leaves;
- To argue whether food is healthy or not;
- To present feeding ways if the food from soil is no longer sufficient or effective;
- To transfer knowledge gained on solving tasks, individually and within the group.

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At the end of the *third lesson*, it is expected that students will be able:

- To compare water and some solutions transportation through different porous materials and to explain the rise of various saps by different types of wood and plants;
- To determine the height at which the sap has rise in different situations, using other experiments;
- To realize that the understanding of photosynthesis mechanism allows the finding of the proper ways for plants growth;
- To listen actively the colleagues communications, to be able to show what they have been able to learn, to cooperate on tasks solving, to find the proper way to teach their collegues what they have studied.

At the end of the *fourth lesson*, it is expected that students will be able:

- To realize the importance of the interdependence between group members, which stimulates them to cooperate, due the fact that the common task can be fullfied by involving each student contribution;
- To calculate and to compare between them the measurement errors, seeing in this way which group has been performed a more accurate work;
- To determine the surface tension coefficient for various saps.

Suggested teaching approach:

By placing the students in the situation to reflect, to ask and ask themselves, to find solutions and verify experimentally and logically, *questioning and discovering* in the frame of an investigative approach are ways for a better knowing of the reality.
The teaching will be made using an *interactive training*, by the *mosaic method (Jigsaw)*, because the emphasis is on building individual knowledge, so the students to become active subjects of an activity guided by personal needs and after that, to transmite the knowledge inside the learning team.

Advantages of the Jigsaw method:

Mosaic strategy is focused on developing the capacity of listening, speaking, cooperation, reflection, creative thinking and problem solving. Thus, the students must actively listen the colleagues' communications, be able to display what they have learned, cooperate on solving the tasks and find the best way to learn from their colleagues what they have studied.
Essential for this way of structuring the class, is the interdependence between group members which stimulates them to cooperate. Common task can not be accomplished unless each student contributes to the problem solving. The method comprises activities aiming at strengthening group cohesion, improving communication and capacity development in order to facilitate the knowledge acquisition by colleagues.
Through this method, it is annihilate the tendency to establishing hierarchies in groups, because the students with high status and special abilities learn from others as much as they help their colleagues to understand and to learn a sub-theme.

SEVENTH FRAMEWORK PROGRAMME

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Achieving the Competencies:

Competency	This is achieved by
1. Make use of the information in specific language related to the the practical applications in the Science area	Participating in debates with workgroup members and inside the expert groups. Awareness group affectivity, as support of friendship and proving an assertive behavior.
2. Asses the risk factors and recognize the importance of some chemical substances	Devising additional tests to those given on worksheet and using them to distinguish various chemical behaviour.
3. Asses of the risk factors resulted from the practical application (chemical reactions) and recognizing their importance	Developing creative capacities through the use of porous materials in order to manufacture other materials
4. Use in communication a specific language when organizing and processing qualitative data - structural and contextual;	Developing the skills to use informative materials, searching - selecting - structuring
5. Rise the students' own scientific knowledge	Conscious learning concepts (laws / principles) studied into the approached topic / subjects;

Other considerations:

In the animal world, the value of the surface tension coefficient is very important. There is a range of insects able to stay on the water surface or even move on it; a decrease of the surface tension coefficient would be fatal for them. Aquatic birds and some mammals have feathers or fur covered with a fatty acid which prevents them soaking in the water. For them, the presence in the water of substances capable of dissolving the fat (like oil pollution) is often equivalent to the death by drowning. More often, the presence on the surface of a shallow layer may prevent water oxygenation and death of aquatic fauna.

The existence of the surface tension is very important not only in daily activities, household or industrial, but also in the development of the biological processes, in both plant and animal world.
Beyond those general aspects related to the surface tension effects, *there are others aspects that are related to the optimum functioning of the biological systems, such as the rise of sap in plants.*

This is why maintaining the water quality is very important in the maintaining of the ecological balance.

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