

4) Homework: Each student has to count how much fruit or vegetable they eat a week (or daily) and how much vitamin C they get from it. Is it enough? Do they take vitamin tablets? (Bring for next lesson some different fruits and vegetables for an experiment).

5) Experiment: Is vitamin C contained in the fruit, the vegetable?

Work in groups of 3-4 students with different fruits or vegetables for each group (40 min).

Aids: grinding mortar, test tubes, filter paper and apparatus.

Chemicals: distilled water, pieces of fruit/vegetables, 3% solution of ferric chloride, 3% solution of potassium hexacyanoferrate (III) (toxic!), a vitamin C tablet.

Or: Use starch and iodine instead of solution of potassium hexacyanoferrate, which is toxic.

Process:

- a) Grind about 5 grams of fruit (vegetable) and put it into a tube.
- b) Pour 5 ml of distilled water into the tube, mix it and filtrate it.
- c) Add about 2 ml of 3% solution of ferric chloride and 2 ml of 3% solution of potassium hexacyanoferrate
- d) Examine changes of colours
- e) Do the same experiment with a vitamin C tablet.

6) Discussion about the experiment and the homework (15 min).

What colour is the evidence of vitamin C?

Do students eat enough vitamin C?

In comparing vitamin C in tablets and in fruit (vegetables), what are their opinions?

Questionnaire

(More than one answer is possible).

Vitamin C is

An essential nutrient / A protein / A sugar / A lipid

Vitamin C is contained in

Vegetables and raw liver.

Fruit.

Raw liver.

Medicinal herbs.

Vitamin C is important

As an antioxidant.

As a source of energy.

As a source of amino acids.

For immune system function.

Can the human body produce Vitamin C?

Yes / No

Are there any animals which can produce Vitamin C?

Yes / No

What is scurvy?

A kind of herb. / An organ in the human body.

An avitaminosis. / An illness of sailors.

How many mg of vitamin C is the Recommended Dietary Allowance (adult male)

0.2 mg per day.

2 -10 mg per day.

60 - 90 mg per day.

900 mg per day.

You need more vitamin C than the Recommended Dietary Allowance

After the summer season to be suntanned.

In the spring time to prevent spring fever.

All the year to cure tonsillitis.

All year, it is healthy to take as much as possible.

Which solvent is Vitamin C soluble in?

Water / Oil

The amount of vitamin C is lower

After cooking.

After long storing.

Using copper knives.

Leaching away.

Teacher reviews

Various implementations of this GP were done. The teacher from Poland used it as a cross-curricular lesson, as she taught it in English. Her students enjoyed

this GP very much and some of them were surprised to learn that “the lack of vitamin C in the body can cause weak immunity, and even scurvy.” The students also enjoyed doing the experiment in which they had to find out whether they took enough vitamin C to stay healthy. This motivated them, as vitamins are a very real-life topic that they can relate to. The fact that this GP was taught in English was useful also, as according to the teacher “learning science in English will help students learn both subjects. They will be handling real meaning rather than just words and structures. Something other than language must carry messages. That something else is what we see, hear and feel around us”.

The teacher from Portugal and the teacher from Ireland were both also satisfied with the learning results of their students after having implemented this GP. The students were motivated and therefore participated in all the activities with enthusiasm. They were also made more aware of the importance of maintaining healthy nourishment and the importance of Vitamin C.

The SPICE project

SPICE was a two-year project (December 2009 – November 2011) carried out by **European Schoolnet** (<http://europeanschoolnet.org>) together with **Direção Geral de Inovação e Desenvolvimento Curricular** (<http://sitio.dgidc.min-edu.pt/Paginas/default.aspx>) from Portugal and **Dum Zahranicnich Sluzeb MSMT** (<http://www.dzs.cz/>) from the Czech Republic.

The primary objective of the SPICE project was to collect, analyse, validate and share innovative pedagogical practices, particularly those using inquiry-based learning, whilst enhancing pupils' interest in the sciences. SPICE supported this objective by singling out, analysing and validating good practice pedagogies and practices in maths, science and technology (mostly ICT-based) and disseminating them across Europe. SPICE involved 24 teachers from 16 different educational systems (from 15 different countries). This teachers' panel helped the SPICE partners in defining good practices that were then tested in classes by 41 teachers during the school year 2010-2011.

For more information see: <http://spice.eun.org>



Lifelong Learning Programme



Education and Culture DG



Spice was funded with support from the European Commission.

This document reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.