From the land to the table

Summary: the activities of the training course focus on a) the food nutritional properties, in particular milk, derivates and commercial products and b) on methodologies for science education.

Aims: To investigate food properties and raise teachers’ and students’ awareness about food and correct lifestyle, to help teachers develop their role as facilitators of students’ learning, to support IBSE.

Main activities: lab experiments about the evolution of biotechnologies from ancient times to today, discussions.

Narrative: One of the two main aims of the course is to investigate food properties and science in food. The starting point is to invite teachers to reflect on the conscious choices each of us is called to make about eating and food based on scientific knowledge. For this, milk and its nutritive components are analysed as a case study. All activities that are used during the course can be reproduced in class by the teacher. The second fundamental aim of the course is to examine and experiment teaching and learning methodologies for science education. Helping teachers to strengthen their competences and role. For this, the course invests in the teachers as learners, as educators of the young and as reflective practitioners. Teachers contribute their own points of view to the discussion, bringing their personal experience to the development of the experiments. At the same time, they are called to think about their students’ point of view and learning needs. In this, the parents can also be regarded as important agents, as they often influence food choices. Their role in learning is discussed too.

The learning and experimentation process within the course starts with a question posed by the museum experts which leads to initial hypothesis, identification of the parameters to experiment and a first evaluation of the already-acquired notions by the participants. The teachers work in groups on the basis of the question and the hypotheses, aiming to find out the answers on the basis of the data collected through experiments. Group work allows for negotiation of choices, discussion of results, understanding of errors and (indirect) evaluation of the learning methodologies.

The final results of the different groups are shared among all the participants. At the end, museum experts facilitate a general discussion about the methodology adopted as well as about the topic itself. They encourage teachers to focus also on how to adapt the activities to the work in class.

Sharing of experiences among the participants is an important part of the course. The teachers discuss among colleagues and with the museum experts sharing experience, solutions of possible problems and ideas for projects that integrate the topic of the course in the class activities.

As part of the course the teachers receive an educational kit with materials and suggestions of experiments to conduct in class.

The course is part of the activities in preparation of the Expo 2015 which will be hosted in Milan. The course is developed in collaboration with Lombardy Region, Agriculture Department.

### Methods of learning/training
- Inquiry, experimentation, collaborative learning, scientific method, discussion
- In-service, in-service secondary school teachers

### Involved actors
- Teachers, the Region of Lombardy authorities, private company
- Location: National Museum of Science and Technology Leonardo da Vinci

### Languages available
- Italian

### Evaluation parameters
- Discussion
- Evaluation
- Sharing experience

### Where to find the application
- www.museoscienza.org/scuole/corsiFormazione.asp

### Duration
- 2 days, 16 hours

### Optimum number of participants
- 20

### Teachers’ Competencies

| 1 | subject matter/content knowledge |
| 2 | nature of science |
| 3 | Multidisciplinary |
| 4 | knowledge of contemporary science |
| 5 | variety of (especially student-centred) instructional strategies |
| 6 | lifelong learning |
| 7 | self-reflection |
| 8 | teaching/learning processes within the domain |
| 9 | using laboratories, experiments, projects |
| 10 | common sense knowledge and learning difficulties |
| 11 | use of ICTs |
| 12 | Knowledge, planning and use of curricular materials |
| 13 | Information and Communication Technologies with Technological Pedagogical Content Knowledge |
1. Building interest in natural science phenomena and explanations:
   In this training course, interest in natural science phenomena is achieved through the focus on lab
   experiments on food, in particular milk. The topic allows teachers to deepen their knowledge on the scientific
   aspects of food and to understand the relation between science, the individual and society. Teachers are
   called to work and reflect at different levels, as individual learners and as facilitators of the learning of
   their students. The tools used are practical activities, observing, questioning and investigating to stimulate
   their curiosity and the learning process.

2. Building up informed citizens: Students understanding the nature of Science & Science in society.
   The discussion about commercial products deriving from milk stimulates teacher and the students to
   become aware of how food is not an abstract scientific content but is part of our life and is influenced by the
   market. The course aims to show how food science and technology are part of the choices we make every day
   – for example at the supermarket – and how it is influenced by a range of different stakeholders.

3. Develop multiple goals:
   • understanding big ideas in science including ideas of science, and ideas about science
   • scientific capabilities concerned with gathering and using evidence
   • scientific attitudes
   Group work and negotiation as well as the hands-on scientific experiments help teachers - and later on
   students – to understand what is meant by scientific method and to develop skills for reasoning on the basis of
   evidence. This brings to an understanding of the issues addressed by science and scientists themselves, but also
   aims to encourage a scientific mode of thinking by people in their own lives. Food is a very common topic and also
   a scientific one. Teachers are asked to recognize the scientific and every day meaning of words referred to food,
   for example additives, artificial, natural.

4. Understanding students’ concepts and learning style about of science phenomena:
   All teachers have a personal and social background knowledge about food. This is the starting point of all
   the activities. The training focuses on the connection between the participants’ background knowledge and
   the activities experienced in the course all of which aim to develop a wider idea of science.

5. Relevance of the content to daily life of students:
   The course has chosen the topic of milk and milk products exactly because they are very common, well
   known and widely used in everyday life. They also directly connect to everyday choices that people make,
   choices which affect their lives in one or the other way.

6. Understanding science as a process not as stable facts. Using up to date information of science and education:
   The experiments conducted do not always reach the results expected by the teachers. One of the most
   important learning tools in this course is the ‘error’ if treated in an adequate way. The error is addressed and
   analyzed by tutors and participants not only so that teachers can reflect on what did not work, but also in
   order to develop awareness of science as a continuing process.

7. Activities for gaining knowledge, not for entertainment, nor for simple imitating of results:
   Curiosity and enjoyment are used not as aims in their own right, but are integrated in the learning process
   as tools to gain new knowledge.

8. Doing science: experimenting, analyzing, interpreting, redefining explanations:
   The scientific method in all its developmental phases lies at the basis of the training course, and is then
   brought into the teaching process in the classroom. It is used to analyze and understand the topic, it is used
   as a learning method for teachers as facilitators.

9. Assessment, formative – of students’ learning and the summative – of their progress:
   The museum is an informal environment of learning and has a role which is complementary to that of the
   school. Consequently, visitors’ learning is not assessed like in schools. We do not use structured tools or
   processes for assessing the learning experience of our visitors (schools in this case) as this is not part of our
   education priorities. Informal, personalised meaningful experiences for each person in a different way is the
   priority of our education programmes. At the same time, we run self-reflection sessions among education
   staff in order to analyse how our programmes are developed (education methodologies) and how interaction
   with the public takes place. The formative and summative assessment are left to the teachers.

10. Cooperation among teachers and with experts:
    The teachers collaborate with their colleagues and the experts of the museum during the course and after
    the course. On-line collaboration is not widely used among Italian teachers. All training courses are followed
    by structured meetings between museum staff and teachers, in order to offer additional support as well as
    by distance help each time is needed by teachers. The collaboration between teachers and with the museum
    experts aims at solving common problems and adapting the proposed activities to their classes and their
    experience.