Co-funded by the European Union

Food packaging

Image by Freepik

Theme: Sustainable food waste management

Total duration: 6/7 hours to complete all the activities. 4 hours to run the Learning Unit with one activity

School subjects involved (suggestion): chemistry, biology, history, geography, economics, foreign languages

Worksheets: *none*

Digital tools: https://www.youtube.com/watch?v=_5yOfguU0M4

Brief description

There are many elements to evaluate that our cuisine is as sustainable and healthy as possible: origin of the food, seasonality, production model, ingredients (additives, flavourings, fats, sugars included), and last but not least the packaging.

How much packaging is used to transport and sell food? With this Learning Unit we study how to reduce the production of rubbish in the kitchen. Food used for cooking is packaged in different ways depending on transportation and where it is sold. Tetra Pack, different type of plastic, paper, cardboard, glass and wood are in common use and fill the rubbish bins of all homes.

Refining knowledge of the materials used and their environmental impact serves to address the issue of waste and find alternative solutions for cooking without creating waste.

Zero waste for sustainable cuisine!

Learning Objectives

Students will learn about:

✓ the materials of packaging and their relative's codes

✓ different times and ways of biodegradability of materials

✓ organize and carry out an interview

✓ chemistry of packaging materials (Tetra Pack, different type of plastic, paper, glass, wood)

Students will be in a position to:

✓ choose the best way to reduce the produce of waste in the kitchen

✓ conduct a long-term experiment

✓ recognize packaging codes

Steps of the Learning Unit

Orientation

Duration: 20 minutes
School subjects involved (suggestion): technology, English, chemistry, biology, mathematics
Where the activity takes place: *in the classroom*
Method (how the students have to work): *As a class*
Equipment / materials:
https://eniscuola.eni.com/it-IT/didattica-scuola-secondaria/scienze-della-terra/rifiuti.html

Description:
This Step is aimed at introducing the LU topic and stimulating the students' interest.

Teachers can bring food packaging of various types to class (various types of plastic, glass, wood, etc.) and bags used for transport to show to the students. The teacher activates a reflection by the children on the use of packaging and the resulting environmental impact. The agrifood sector is responsible for over ¼ of CO_2 emissions and is responsible for the production of approximately 42% of total packaging production. If we add to this the beverage sector (represented by 23%) we arrive at approximately two thirds of the packaging produced. An expanding sector driven by the growth of single-portion packaging and ready-to-eat foods.

It is possible to focus on just one material or take into consideration all the materials used for the transport, sale and preservation of food. It may involve activities like showing multimedia (pictures/videos/website - e.g.: on plastic- https://www.youtube.com/watch?v=N3m_NtQTnfc ; on bioplastic - https://circularity.com/en/blog-bioplastic/) or doing a presentation on the topic, asking simple and direct questions to the students and encouraging brainstorming, taking the students outside for a field visit that will stimulate their interest on the topic at hand, or even have them implement a simple practical activity related to the topic.

The students can think of **a typical dish or recipe** of their like and choose a favourite one to work on the ingredients from the point of view of packaging and transport.

The activities need to stimulate the students' interaction and recall existing knowledge or perceptions of the students. Also, the activities need to be inclusive and encourage the participation of all students, regardless of their prior interest or performance in related school subjects. Make sure not to assume any knowledge of scientific terminology when posing questions.

Conceptualisation

Duration: 30 minutes

School subjects involved (suggestion): technology, English, chemistry, biology, mathematics, science, civic education
Where the activity takes place: *in the classroom*
Method (how the students have to work): *Indicate whether students work in groups or as a class*
Equipment / materials:

Description:

This Step aims at formulating a hypothesis or questions on the specific topic that will be explored through the investigation. Based on the orientation phase, students are invited to brainstorm or discuss what they are interested in exploring regarding waste reduction. The ingredients that were purchased to prepare the recipe they chose are often packaged with materials that are a source of pollution.

The students may work in groups to propose a hypothesis or questions that will then be refined in plenary by the whole class.

A hypothesis is an affirmative statement, that will then be tested through investigation on whether it stands or not, e.g. "it is possible to cook without producing waste".

Alternatively, the students may formulate a central question for investigation, that in turn can be broken down to several sub-questions. E.g. the central question can be "What impact does packaging have on the environment?" or "Do the ingredients I use to prepare the recipe really need packaging?". This in turn can be broken down into sub-questions such as: "Where can I buy them without packaging?" and "How can I transport them?"

The hypothesis or questions formulated and finalised will guide the investigation that follows.

Investigation

Description:

This Step aims at carrying out all necessary activities in order to test the hypothesis (or answer the questions) formulated in the Conceptualisation Step. It may include any kind of activity that can be organised within the Learning Unit and it can be specific for each ingredient of the selected recipe/dish. This Step necessarily involves 3 stages:

- **1. Planning the investigation activities to be implemented**. This includes deciding which investigation methods/activities to employ from the ones proposed in the framework of the specific LU in order to test the hypothesis (or answer the questions) formulated, and creating an Investigation Plan with the help/guidance of the teachers who can propose adjustments. The objective is to create a realistic and reliable Investigation Plan that includes the activities to be implemented in order, the necessary equipment, any outside experts to take part, and an estimated timetable.

- **2. Performing the investigation activities.** Describe each proposed investigation activity in the framework of the LU, including the objective of the activity, guidance on carrying out the activity (including the preparation), equipment/materials needed, estimated duration, the digital tools that may be employed, etc.

- **3. Analysis of results and main findings**. Describe how to analyse the results and conclude on findings per investigation activity proposed.

Activity 1 - Market or supermarket?

Description:

It is proposed that the students examine certain ingredients, e.g. eggs, bread, tomatoes purchased at different sale points, with special attention to the packaging and(or) final container used to carry the shopping and the origin of the products. The packaging is often conditioned by the goods final destiny and the type of transport needed (short or long distance, etc.). Pupils should identify the most environmentally friendly (sustainable) combination of transport and packaging and justify their choice. The work can be done by the whole class or in groups. In the end, the class will have to make a single choice.

Duration: 1 hour in classrooms and 1 hour in a market
School subjects involved (suggestion): Civic and environmental education, Science, geography, chemistry
Where the activity takes place: in the classroom and at a local food market, at a supermarket.
Method (how the students have to work): in groups
Equipment / materials: -/-

The format below may be employed:

1) Planning
Location: in classroom
Time: 30 minutes
Materials: none

Description: The students will be divided into groups and each group chooses where to buy the ingredients to prepare the recipe, whether a supermarket, the grocery stores or the central market. Students can go shopping at the weekend or at the end of the school classes, one afternoon with light homework.

2) Performing
Location: outside in a food shop or market and at home
Time: 60 minutes in the afternoon or weekend

Equipment / Materials: -/-
Digital tools: Google maps or similar app to locate nearby shops or supermarkets
https://www.google.it/maps

Description: Each group goes to different places to buy the same ingredients. Groups will go to the market or local grocery store and others will go to the supermarket. Students can ask the shopkeeper questions about the choice of packaging to handle food.
When they return home each group lists all the packaging obtained indicating type of material (symbol), weight. A brief report or a video of the interview can be used in the next step.

3) Analysis / Findings
Location: In classroom
Time: 30 minutes
Equipment / Materials: none
Digital tools:

Description: The groups compare the packaging materials they have and discuss the different origins of the purchases made. Comments are made on the videos and on the packaging market choices.

Activity 2 - Plastic polymers, degradability and recycling

Description:

Plastics are recyclable but not biodegradable or compostable, capable of being degraded by biological processes in the external environment or in dedicated plants.

Until a few years ago they were the only material for packaging (bags, water bottles, various containers), but their persistence in the environment is pushing them to look for alternative materials.

In this activity, the students will improve their understanding of the labels as well as learn to use some Apps and Web-based tools to know more about plastic and bioplastic materials and their biodegradability. With this activity it is possible to verify the degree of biodegradability of certified and non-certified bioplastics.

Duration: 2 hours (one a month apart)
School subjects involved: Biology, Chemistry, Mathematics, English, Science
Where the activity takes place: In the classroom and (or) as homework
Method (how the students have to work): in groups of several students with the help of the teachers/researchers (to be discussed with the teachers).

1) Planning
Location: In classroom
Time: 30 minutes or more

Equipment / Materials: materials from packaging
Description:
The students select the materials of packaging that will be investigated and they do research on the symbols they find on the packaging and which materials they correspond to. Below is a video on the plastic code:

Plastic Resin Identification Code-Plastic Recycling Process-Injection Molding

With the help of the teacher of chemistry the topics can be deeper as requested.

It's needed to find boxes to fill with organic potting soil.
With the support of the teachers students identify the place where to leave the boxes for a month (it is better if in a warm place)

2) Performing

Location: at school
Time: 30 minutes
Equipment / Materials: Boxes, organic potting soil, sticks and labels, materials from packaging
Digital tools: none

Description:
In this action the students have to:

- put the plastic materials in different areas of the box, all the plastic and bioplastic materials have to be covered with the organic potting soil
- periodically spray water to keep the soil moist
- after a month check the level of biodegradability of the materials

4) Analysis / Findings

Location: In classroom
Time: 60 minutes
Equipment / Materials: none
Digital tools:

Description:
The students will organise the results of all the investigations in a report of results (a video, a text or a presentation) where they describe the chemistry and the state of decomposition of different materials

Conclusion

Duration: 60 minutes
School subjects involved (suggestion): technology, English, chemistry, biology, mathematics, science, civic education
Where the activity takes place: *In the classroom*
Method (how the students have to work): *students work in groups and as a class*
Equipment / materials: computers, whiteboard

Description:

This Step aims at bringing together and reporting the results/findings of the Investigation activities carried out, and draw conclusions in terms of the hypothesis tested (questions explored). The students may report the results/findings of each investigation activity in groups (i.e. each group reports on a specific activity), and then discuss them in plenary as a class. Have they managed to test the hypothesis or answer the questions they formulated in the Conceptualisation Step? To what extent? The students should then be encouraged to brainstorm on possible ways to improve the considered aspect in terms of their selected recipe.

The participation of teachers from different STEAM subjects is encouraged in this Step, in order to guide the students, make sure different aspects are taken into account, and provide guidance in case of conflicting findings.

Discussion

Duration: 60 minutes
School subjects involved (suggestion): English
Where the activity takes place: In the classroom
Method (how the students have to work): As a class
Equipment / materials: -/-

Description:

This Step aims at verifying the students' acquired knowledge, skills and competences. The students are invited to provide a solution that improves the selected recipe/dish (e.g.: where to buy the ingredients to have less packaging, and how to recycle or dispose of the packaging obtained by cooking the recipe).

The students may also be encouraged to present their findings and proposals to their peers at school.