MUSEO NAZIONALE SCIENZA E TECNOLOGIA LEONARDO DA VINCI

EDUCATIONAL MODULE

Valuable Market

In a nutshell

'Valuable Market' engages groups of citizens in two interconnected activities: the first one concerns the collection and recovery of fruit and vegetables remaining unsold or at risk to be thrown away at the end of the day in a neighbourhood market; subsequently, an experimental activity using the recovered produce aims to increase participants' knowledge about the nutritional values still present in the recovered food (presence of vitamins) and start a discussion on food waste.

Food 2030 focus

What for?

To explore and understand the food system
To work with community on transforming the food system
To train or educate people on food system transformation

For whom?

For educators in formal and informal education to use with students, civil society organizations, citizens and general public

How long?

3 hours

Created by

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Something to share?

Leave us a comment about this tool on the FIT4FOOD2030 Knowledge Hub.
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This tool was developed as part of the FIT4FOOD2030 project; find this tool and many more on the FIT4FOOD2030 Knowledge Hub.

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What will you gain from this?

As an educator or facilitator, you can use this module to involve participants in a community activity, in the process of recovering and redistributing of wasted food or food at risk of becoming food waste. Through the experimental activity in a lab setting, they become aware of the still-present nutritional value ofrecovered food and how to concretize an action to combat food wastage.

After the successful completion of this module, participants are expected to be able to:

- Understand the process of food waste in a neighborhood market and possible solutions
- Value and prioritise the ethical, social and cultural features of food
- Become aware of the concrete actions they can undertake in order to contribute to social needs (such as self-organized groups acting against food waste)
- Recognise the nutritional properties of food which risks being wasted

VALUABLE MARKET

This module is composed of two activities, in two different settings of implementation:

- *Setting 1: Neighbourhood market with fruits and vegetables stands.*
  This activity is carried out in collaboration with associations or vendors that undertake actions of wasted food recovery. Participants can be involved in the process of recovering food remains in markets, in order to experience a possible solution to reducing food waste.
- *Setting 2*: *Museum lab, classroom or any other space that can be arranged with tables, chairs and kitchen utensils.*
  Participants are involved in an experimental hands-on process to analyse the nutritional properties of the food that could have become food waste but was recovered.

A science animator and a volunteer from a wasted food recovery initiative help children in the process of vitamin analysis

Thematic area

Food waste, Ethical and social value of food, Social inclusion, Active citizenship.

Target audience

Students, citizens, general public

Age of participants

Activity 1: Adults, students (16+ year olds)

Activity 2: Families with children (8+ year olds)

Number of participants

Activity 1: 10 - 20

Activity 2: 10 - 20

Number of facilitators

Activity 1: 2 facilitators + 1 member of the food recovery association

Activity 2: 1 facilitator

Prior knowledge required for participation

No prerequisites.

GETTING PREPARED

Set the scene

Activity 1- Collection of food at the market
Before the activity starts, you could create *an easily identifiable area* (such as a welcome station, table or stand) as the meeting point for the participants. The station is arranged with boxes or recovered containers, available to be used during the collection.

Activity 2 – Experimental activity
This activity can take place in a room, in a classroom or in a school science lab; tables and chairs are set up to create 4 workstations, in each of which 5 people work together. A table for each workstation is needed to place the material for the activity.

Note that it is better if no more than two days pass between the two activities to prevent fruit and vegetables from rotting.

Materials

Activity 1 - In the market

- Between 10 to 20 (one for each participant) recovered boxes or containers
- 1 weight scales

Activity 2 – Experimental activity

- 1 small pot or any other container for heating the water
- 1 microwaves oven or hotplate
- 1 l of water
- 2 1-liter bottles with stoppers
- 4 droppers
- 5 drops of iodine tincture
- 2 tablespoons of corn-starch or wheat powder
- 4 mortars with pestles
- 4 juicers
- 4 knives
- 4 cutting boards
- 20 dishes
- 20 small glasses or 50 ml/100ml beakers
- Recovered fruit and vegetables
- 2 effervescent vitamin C tablets
- 60 drops of Lugol's iodine
- 300 ml of reagent (starch in solution)

FLOW

Activity 1 - In the market

STEP 1a: Preliminary preparation
STEP 2a: Group management
STEP 3a: Introduction *(10 minutes)*
STEP 4a: Collection of the food *(40 minutes)*
STEP 5a: Conclusion-Redistribution *(1 hour)*

Activity 2 – Experimental activity

STEP 1b: Preliminary preparation
STEP 2b: Group management
STEP 3b: Introduction *(15 minutes)*
STEP 4b: Searching for vitamins in recovered fruit and vegetables *(30 minutes)*
STEP 5b: Conclusion *(15 minutes)*

FACILITATOR TIPS

Carrying out the experimental activity

- PREPARATION
  First, the preparation of the setting and the context of the activities is crucial to create a positive atmosphere in which participants can work, both in terms of the actual physical space and the way participants and stakeholders are engaged.

- DURING THE ACTIVITY
  It's important to stimulate the direct participation of each participant, trying to avoid demonstrations. For a successful activity, encourage hypotheses, descriptions of the phenomena or any other comments before and during the practice. Alternate moments of practical, hands-on activities with dynamic interaction using questions and debates. Regarding the scientific aspects of the experimental activity (*Activity 2*) it can be useful to have a look beforehand at the content of *Appendix A* and *Appendix B*.

- DISCUSSION
  During the collective discussion moments, try to stimulate and boost the horizontal interaction, asking a lot of questions and enhancing the debate among participants. For a successful debate, let the participants start the discussion in small group first, limiting your intervention to just checking up on each group. Then, invite participants to share in plenary their thoughts about the theme.

Images illustrate, from top to bottom: food recovery station in a public market; food remains; the experimental setting; and vitamin extraction.

ACTIVITY 1 - IN THE MARKET

STEP 1a: PRELIMINARY PREPARATION

BEFORE THE ACTIVITY STARTS

Before the activity takes place, you can visit the chosen market in order to sensitize and engage the vendors about the aims and the different phases of the collection. It is better to set the beginning of the activity at least one hour before the market closes, when vendors start to count the products unsold and dispose of the waste.

STEP 2a: GROUP MANAGEMENT

AS PARTICIPANTS ARRIVE

Welcome the participants in a predefined area, identifiable with a station (such as a table or stand) arranged with boxes or recovered containers. Provide them with some explanation about the activity and the materials needed.

STEP 3a: INTRODUCTION

10 MINUTES

Agree with participants:

- How the collection will be organised (in groups or pairs)
- Where each group or pair is going to do the activity (which stand?)
- Some questions to address to the vendors in order to find out why some types of fruit and vegetables remain unsold (How much fruit is left? Why? What do people prefer to buy? How many products do you buy from your wholesaler? Where does this type of vegetable come from? Have you any recipe to suggest?)

STEP 4a: COLLECTION OF THE FOOD

40 MINUTES

The participants, in groups or pairs, collect fruit and vegetables donated by the vendors and bring the food at the welcome station where the redistribution will take place.
It is better to throw away fruit and vegetables which are clearly rotten and no longer edible.
Then, the participants proceed in weighing the food, in order to know the quantity that has been collected.

TIPS & TRICKS: **Adapt the activity to your context**: the modalities of fruit and vegetable distribution changes in relation to different national contexts. Therefore, the activity part related to the market can be set in alternative ways, considering the specific situation of your setting.
For example, you can try to involve supermarkets, or buy directly fruit and vegetables, preferably in 'bad' aesthetic conditions, and start the experimental activity with these products, engaging participants in the discussion about how we perceive the quality of food by its aspect.

STEP 5a: CONCLUSION-REDISTRIBUTION

1 hour

Place the food in boxes or other containers. You can organise the distribution towards:

- Associations which operate and help in matter of food poverty.
- People who spontaneously show up at the distribution point, until all fruit and vegetables are used up.

Save about 20 products from among the fruit and vegetables collected for the experimental activity.

ACTIVITY 2 – EXPERIMENTAL ACTIVITY

STEP 1b: PRELIMINARY PREPARATION

BEFORE THE ACTIVITY STARTS

Before the activity starts, prepare the Lugol's iodine following these steps:

- Prepare the reagent: pour 500 ml of water in a pot and add 2 tablespoons of corn-starch. Bring the mixture to the boil for few minutes (it's possible to use a microwave oven to do this) and let it cool. The quantity of the reagent prepared is actually greater than the one needed for the activity, but it is better to have a stock available. Store the liquid in 1-litre bottle and close it with a stopper.
- Prepare Lugol's iodine: pour 250 ml of water in a bottle with stopper and add with the dropper 5 drops of iodine tincture. Close the bottle and shake. The quantity of Lugol's iodine prepared is actually greater than the one you'll need for the activity (about 60 drops); but as it's difficult to foresee the exact quantity that will be necessary, it's better to have a stock available.

STEP 2b: GROUP MANAGEMENT

AS PARTICIPANTS ARRIVE

Welcome the participants, divide them in groups of four and clarify the aims of the activity.

STEP 3b: INTRODUCTION

15 MINUTES

Present to the participants the aims of the activity:

- to share, to discuss and to compare the information given to them by the vendors.
- to investigate the nutritional properties (more specifically the presence of vitamins) of the collected food.

Ask participants to report the results of the inquiry done with vendors, namely the answers given by the vendors regarding the reasons of food surplus.
Comparison and discussion about the answers are helpful to identify the common factors that emerge by the vendors' experiences and opinions. This can set the base for discussion and reflection, as those factors can be related to food system dynamics and also to the everyday life experiences (i.e.: consumers' habits, availability and prices of certain types of products, packaging…)

STEP 4b: SEARCHING FOR VITAMINS IN RECOVERED FRUIT AND VEGETABLES

30 MINUTES

To introduce the experimental activity, you can ask some questions, such as:

- Do you already know these fruits/vegetables?
- Where do you think that this food comes from, from which place in the world?
- Would you eat it? Why?

And once the participants are ready to manipulate the food with the tools:

- What do you think these fruits/vegetables contain?
- Why do we eat fruits and vegetables?
- Can the food about to be thrown away still be good?

Each group works with two fruits or vegetables. Provide them the following instructions:

- Cut, squeeze, crush with mortar and pestle fruit and vegetables to extract the juices. Extract 25 ml of juice for every fruit and pour it in a glass or in a beaker.
- Add 25 ml of reagent in each beaker with extracted juice.
- Add 4 or 5 drops of Lugol's iodine and observe the reaction (if the colour of the reagent changes once it touches the liquid).
- Prepare the comparison: dissolve half a tablet of vitamin C in a beaker with 25 ml of water.
- Add 25 ml of reagent and 4 or 5 drops of Lugol's iodine and observe if the colour of the reagent changes once it touches the juice.

Help them interpret the results:
- If the purple colour disappears, the juice contains vitamin C.
- If the purple colour doesn't disappear, the juice doesn't contain vitamin C.

The comparison solution with vitamin C (the purple colour of the reagent disappears) is there to help participants understand how to interpret the result. In most cases, if it hasn't been too long since the collection of the fruit and vegetables at the market, vitamins are still present in the recovered food products, displaying a similar reaction as the comparison solution.

Share the experimental results of each group and discuss about the quality of the recovered food.

STEP 5b: CONCLUSION
60 MINUTES

In the final part of the activity, focus on on the results of the activity in order to point the attention to:
- the reasons why we waste food;
- the nutritional properties, which are still present in the food we waste;
- the key messages of this educational module.

Some guiding questions could be:

- Which kind of food do you waste in your home?
- Where does the wasted food go?
- Do you know any food waste recovery practice?

In this process, the facilitator doesn't give explanations directly to the participants but engages them with questions on their perception of waste and on what emerges from the experimentation.

TIPS & TRICKS: **Connect to everyday life experiences**: it happens to every one of us to consider if food is still good or if it needs to be thrown away, so try to engage the participants in the discussion by making them reflect about their way to live such daily routines and mechanisms. At the same time, if someone does not will to participate to discussion in a particular moment or has nothing to say, avoid to force him/her to express himself/herself.

APPENDIX A: PREPARATION OF THE LUGOL'S IODINE

Materials

- 1 bottle of amber glass with stopper or a beaker (600 ml capacity)
- 15 ml test tubes with stoppers
- 1 graduated pipette
- 1 funnel
- iodine tincture (available in pharmacy)

Preparation

Bring the iodine tincture, the plastic pipette, the bottle or the beaker.

Aspire with a pipette some iodine tincture.

Pour 5 drops of iodine tincture in the bottle or in the beaker and add water up to reach 250 ml. Mix the solution. At the end of the procedure, the Lugol's iodine appears limpid and brownish.

Safety and disposal

Read the iodine tincture safety sheet carefully to use it safely and dispose of it properly.

APPENDIX B: EXPLANATION OF THE REACTION

(This information can be useful to the facilitator while he addresses to the participants, to stimulate the reflection on the key items of the experience)

The reagent (water and corn-starch, as known as starch solution) is a turbid liquid which assumes an intense purple colour when in contact with Lugol's iodine.
Lugol's iodine (or Lugol solution) is an hydroalcoholic yellow-brown iodine solution.
Starch consists in a long molecule formed by numerous glucose units. Its helical shape is responsible for the intense purple colouring assumed by Lugol's solution. The molecule of iodine can fit perfectly into the starch helix and this interaction causes an immediate change in colour, from yellow-brown to dark purple.
The reaction described is reversible in presence of vitamin C. The foods containing vitamin C break up the starch-iodine complex and bring the reagents back to their initial colour. The greater the amount of vitamin C present, the greater the change.
In the absence of vitamin C the reagent maintains its dark purple colour.

Coordinated by:

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Partners

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