Food Careers

Taking the first steps towards higher education and careers in the agrifood sector

Teachers' resource pack
for 15-18 year old students

eit Food

Co-funded by the European Union

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About Youth Mission resource packs

Capitalising on previous assets developed by EIT Food partners, EIT Food invited learning experts to create coherent ready-to-use resource packs with and for teachers, available in multiple languages. The resource packs are developed for students aged 9-14 (Food Mission) and 15-18 (Food Careers). Our aim is to create a repository of pedagogical tools about food and food careers. This repository includes lesson plans that can contribute to development of a variety of skills and competencies needed for the future of the food system.

Both resource packs offer:

- freely accessible online materials in multiple languages
- 3 thematic modules including ready-to use, detailed lesson plans
- additional resources to be used in lessons (videos, quizzes and others)
- accompanying teacher workshop training (in the piloting phase)

EIT Food Youth Mission aims to develop knowledge and awareness of healthy and sustainable food, while educating and inspiring primary and secondary school children about career opportunities in the agrifood sector.

Supported skills:

- group work
- creativity
- interviewing
- research
- presenting
- brainstorming complex interdisciplinary ideas
- visioning
- critical thinking
- self-reflection

The most important learning objectives and outcomes:

Systems thinking: Broadening thinking to identify different aspects of food systems and understand their complexity and interrelations.

Systems mapping: Explore the variety of jobs within food systems.

Sustainable lifestyle: Understand sustainability, from farm to fork to disposal.

Healthy eating behaviour: Identify the characteristics of healthy eating patterns.

Introduction to Food Careers resource pack

In 2019, 15.9 million people aged over 15 were employed in the food supply sector in the European Union[1], representing 8% of total employment. The importance of their crucial role became truly visible in the coming years during the pandemic, when they were ensuring the essential needs of households, by keeping supermarket shelves as well as our plates full.

Almost half of the people employed in the food supply sector worked in crop and animal production, hunting and related service activities (46%). Meanwhile, jobs in the manufacture of food products accounted for 26% of employment of this sector, followed by jobs in retail sale of food, beverages and tobacco in specialised stores (15%); wholesale of food, beverages and tobacco (8%); manufacture of beverages (3%); wholesale of agricultural raw materials and live animals (2%); and fishing and aquaculture (1%). People employed in bars and restaurants are not included in the food supply sector.

The European agri-food sector is facing challenges regarding growth, fragmentation, low innovation spending and the slow uptake of new technologies. In addition, there are wider societal challenges like demographic growth, competition for resources and climate change. More than 99% of the companies in the sector are small businesses, making it difficult to realise economies of scale, to be competitive on the global agri-food market and to take advantage of innovations[2,3].

The food industry employs 4.8 million workers (excluding the primary sector[4] where 22 million workers find jobs[5]). Such a workforce demands a wide variety of professional profiles with specific skills and competences focused on sustainability, bio-economy, digitalisation, communication, strategic & critical thinking, as well as knowledge of the entire food value chain. The Food Careers resource pack will complement national school curricula by allowing secondary school students to grow their understanding of in-demand skills in the agrifood sector whilst also being upskilled. The learning material will also help to encourage students towards meaningful careers in the agrifood sector.[6]

Food Careers aims to work with teenagers in middle and high school at a critical stage of their development in which they start making their own choices and form opinions that can influence their daily lifestyle choices for both their own and planetary health. As such, they will be encouraged and empowered to develop critical thinking skills when making dietary choices, thereby supporting the urgently needed food system transformation. Furthermore, this project will enable them to engage with academia and industry in order to further understand and participate actively in the food supply network.

[1] Eurostat
[2] EIB
[3] Feeding future generations: How finance can boost innovation in agri-food
[4] "The sector of an economy making direct use of natural resources. This includes agriculture, forestry and fishing, mining, and extraction of oil and gas. (Oxford reference)
[5] presented in the Future of Food conference (16.06.2022, Brussels) by Remigio Berruto: "Future needs for training in agriculture and agri-food sector: results from the E+ Blueprint FIELDS project
[6] see above

Target group, learning objectives and supported skills

The Food Careers resource pack targets secondary school children from the age of 15-18 with a challenge-based approach, building on the local food ecosystem and opportunities. The aim is to inspire and encourage young people to study a food-related discipline while raising awareness on opportunities and career tracks in the agrifood sector.

Learning objectives of Food Mission:

- to examine and understand the food systems that surround students and potential areas for innovation
- to become familiar with various jobs and careers in the agrifood sector
- to explore how agrifood jobs are linked to sustainability
- to increase understanding of food science and conduct experiments
- to become equipped on how to design and market new food products
- to understand the importance of raising awareness of careers related to the food industry
- to demonstrate the skills required in the agrifood sector and the potential opportunities they offer
- to encourage students to choose careers in the food industry
- to become familiarised with challenges in the agrifood sector.

Lesson plan types

The authors strived to offer a wide variety of lesson plan types to experiment with. Most lesson plans are interactive, relying on students' collaboration, curiosity and creativity.

Lesson plan types include:

1. Theory
2. Lecture + Discussion
3. Lecture + Exercises
4. Experiment
5. Lecture + Game
6. Games/Simulations
7. Role play
8. Case study

How to use this resource pack?

In the Food Careers resource pack, you will find 3 thematic areas/modules accompanied by ready-to use, detailed lesson plans.

Thematic modules for Food Careers resource pack:

- Exploring Food Systems
- Agrifood Jobs and Careers
- Food Science and Entrepreneurship

Conforming to class duration, lesson plans consist of 45 minute agendas, however, some topics need more time and therefore more classes - this is indicated when relevant.

Each lesson plan is a coherent unit and can be used separately. However, you can also link lesson plans to each other, creating a series of food-related classes for your students (e.g. ideal for thematic weeks or longer projects).

Lesson plans indicate preparatory time needed, recommended subjects, short descriptions, lesson plan types, agenda, detailed instructions, supporting materials and additional resources (information for teachers' extended learning). You can access supporting materials (hand-outs, videos, games, etc.) via the links provided in the lesson plans.

A note for national language variation: while authors tried to create materials that can be used all around Europe, they are aware of regional and national differences. Please substitute some resources and materials with something from your own country if you feel it is necessary.

Preparation time: All lesson plans include a reference to the amount of time needed to prepare for class. Classification includes: short (about 15 min.) medium (30 min.) and long (more than 30 min).

Evaluation and assessment of the lesson plans

If time allows, please do a quick evaluation and feedback round of the learning material you have covered and the lesson plan you have used. Our suggestion is to ask students the following questions:

1. Name one thing you did not know before the lesson
2. Name one thing that surprised you about the topic
3. Name one thing you want to start doing as a result of what you have learned

Their feedback can spark new conversations and discussions for the next class and also help guide you towards the most effective topics and lesson plans.

Legend

- Learning objectives
- Duration
- Preparation time
- Can be aligned with the following subjects

Modules and **lesson plans**

In this section you can read more about each module and their accompanying lesson plans.

Exploring Food Systems

Exploring Food Systems

We hear about the importance of preparing future generations to face major sustainability challenges and transform the systems around us, but what does this mean in reality? In this module complex terms such as systems thinking and systems innovation are brought to student-level, preparing them to be resilient, flexible and adaptable in their future careers and to lead the necessary changes towards a "greener" society.

The reason why this is needed is because complex challenges such as climate change, transformation to sustainable agriculture or shortening the food chain require radical changes. As has been proven time and again, simple solutions and one-time interventions do not necessarily work anymore and often bring more harm than benefit. Instead of trying to identify one or two causes to certain issues, we must see the big picture; shifting our mindset towards systems thinking, considering a plethora of stakeholders, analysing and assessing their connections and dynamics and working in teams to tap into community talent. This module is honing these skills by urging students to explore the major challenges in the food system, map their local food ecosystems and find points of intervention to transform it to a more sustainable and healthier one. One lesson plan is also included on regenerative agriculture, presenting an inspiring case study as an example of how things could look different once we start thinking in terms of systems and sustainability in agricultural practices.

Learning objectives

Students will:

- Assess and think with a systems mindset
- Evaluate the complexity of food systems
- Analyse their local food ecosystem and innovation opportunities
- Explore major challenges in food systems
- Compare regenerative and conventional agriculture.

Lesson plans in Exploring Food Systems module:

1. **Foodscape mapping and the foodscape walkabout:** map local food environments around the school with focus on opportunities for healthy and sustainable eating, exploring possibilities for innovation.

2. **School food for the future:** learn about the importance of good school food and its impact on sustainability and health, learning about how food at school can be seen as a business and career path.

3. **Challenges and opportunities in the food system:** learn about the challenges in the food system and brainstorm about professions that could offer solutions to these challenges.

4. **How to make chicken happy? Regenerative vs. conventional agriculture:** learn about the differences between conventional and regenerative farming along with the main advantages and disadvantages of both approaches.

Foodscape Mapping and the Foodscape Walkabout

Module: Exploring Food Systems
Type of lesson plan: Simulation, Discussion

Short description of the activity:

Local community food environments have a huge impact on availability of food and therefore the opportunities to practice a balanced diet. At the same time the local food environment is a source of livelihoods and business opportunities and it has a direct impact on both individual and planetary health. The idea of the Foodscape Mapping with the Foodscape Walkabout approach is to create a better insight into the "edibility" of the local community and to understand how a local foodscape – the totality of the local food environment – can be characterised in terms of quality. Students will be able to understand how a local food ecosystem creates the local food environment and what businesses can thrive there. Students will be able to reflect on how they can contribute to a more healthy and sustainable food system when making career decisions. As the title indicates, the activity is a mapping process and is based on simply walking in the local neighbourhood with the task of registering/mapping what kind of food activities are there.

Students will:

- Map the local food environment around the school with emphasis on opportunities for healthy and sustainable eating
- Brainstorm about new types of food businesses that could add value to the local community
- Examine what kind of educational programs that they would need if they were themselves to pursue the idea

Duration:

90 mins

Preparation time:

medium

Can be aligned with the following subjects:

Home Economics

Duration	Activity	Materials/Equipment
10'	Warm-up questions and quick explanation on foodscapes	Pen & paper
5'	Explaining rules, group creation	
40'	Foodscape walkabout	Note taking, picture taking etc.
20'	Harvesting back in class	Work in groups
10'	Local foodscape careers	Plenary
5'	Closure and wrap up	

Detailed instructions:

Warm-up questions and quick explanation on foodscapes

The teacher is encouraged to ask the following guiding questions:

- How do you decide what to eat?
- What are your food choices based on?
- Is it you and your preferences or your environment that is shaping your choices?
- If you answered it is you and your preferences, where do you think the origins of those preferences are? What shaped them in the past?

The aim is that students realise that they are part of a larger food system with various stakeholders and connections and that the system heavily influences their daily food choices and preferences.

Explaining rules, group creation

After the guiding questions, the teacher explores different aspects of the local foodscape and their importance, before discussing how available food options and their quality are linked to both global and local health.

Definition of foodscape: a foodscape can be understood as the food environment around the local space. For example, the interaction of food, people and places around a school would represent an interesting foodscape.

Foodscape studies is a variation of food environment studies that is concerned with looking at how people interact with food in a given spatial context – for instance your local community. Foodscape studies have been extensively used both to understand what kind of environmental improvements can be made and what kind of improvements benefitting individual nutrition can be made. The idea is based on the fact that we do not necessarily fully decide what to eat ourselves. Instead it is to a high degree determined by availability.

One can have a high quality, diverse foodscape with lots of healthy and affordable options or one can live in a "food desert", where healthy and affordable food options are not readily available[7] and one must rely on processed food options. A "food swamp" is considered worse, describing an area where there is an abundance of fast food outlets and shops selling alcohol that outnumber healthy food options[8].

Unsurprisingly, living in a food desert or food swamp has a negative effect on city dwellers' health. Therefore, adopting a systemic view on health issues such as obesity is important, since there is a direct correlation between citizens' health and the quality of their surrounding foodscapes[9].

In this lesson, the teacher provides an introduction to the rules of the foodscape walkabout, sets the boundaries, decides where the students are allowed to go and most importantly what the rules are for interacting with local people on the walkabout.

[7] Food is power
[8] Bluezones.com
[9] Science Daily

Rules of the walkabout:

- When with members of the public, students must introduce themselves and the purpose of the interaction
- Permission must be asked for if students want to take photos, especially in the case of close-ups (where people are recognisable)
- Pen and paper are the most important tools during the walkabout as students will draw a map based on what food choices they see during the walk. These can be restaurants, food outlets, street food vendors, or anywhere you can get food from
- The time limit of the activity must be respected.

Foodscape walkabout

Students walk out in groups exploring the food opportunities and creating the foodscape map of their area.

They have to create their own legend and map, indicating the different food options (e.g. restaurants, fast food outlets, stores, retail stores, community gardens, food markets etc.)

Meanwhile creating the map, students need to pay attention to the local stakeholders as well, who are interacting with these "food points".

- Who is buying food where?
- How are local residents interacting with these food locations?
- What kind of audience can students see?
- What can be the reasons for them buying at specific food locations?

Harvesting back in class

Once the foodscape walkabout has been carried out the students go back to class. Groups present their maps listing interesting and/or surprising insights and compare their maps with other teams. Then they evaluate their foodscape:

- What is your assessment of your foodscape? Is healthy and nutritious food easy and affordable to buy? Or do you live in a food desert or food swamp?
- What kind of improvements could be made in your local foodscape? How would you redesign your foodscape map if you wanted to improve citizens' health? How would you redesign your map if you wanted to improve sustainability?

Local foodscape careers

Students discuss what kind of careers and jobs are available in their local foodscape. Would they like to be involved in creating their local foodscape or not? If yes, which available jobs are attractive for them? If some careers are attractive, what kind of vocation is needed for these? If they don't see any attractive jobs, could they create something that they would like?

Closure and wrap-up

Guiding questions could be:

- Seeing these maps, how do you think your local foodscape influences your food choices?
- If you wanted to eat healthier, what changes could be made in your local foodscape?

This class demonstrated how the system can influence its stakeholders and how the available choice of food influences the health of a population. It also demonstrated that we cannot simply blame individuals for poor choices of food that could lead to illnesses and obesity, because we always have to look at the surrounding system that supports these poor choices.

Suggested variations

1. Invite local foodscape stakeholders

Representatives from local community food stakeholders, retailers, school food operators etc. can be invited in to tell about their businesses and the educational opportunities and requirements.

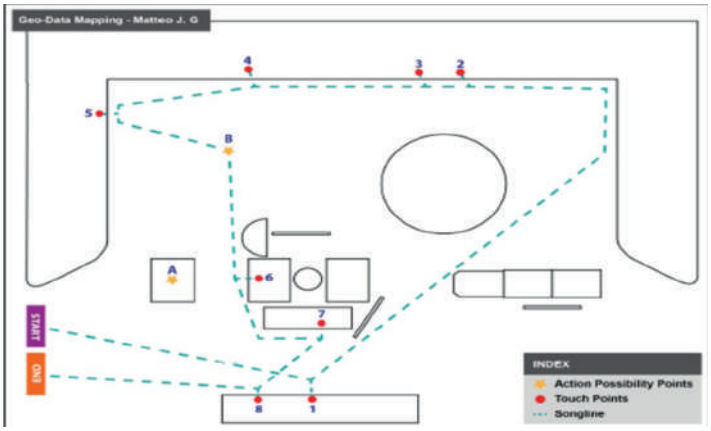
Bundgård. I. & Jørgensen, NK: The further development of a foodscape approach based method for assessment and intervention opportunities in a local community food environment.

2. Walkabout within the school building

If it is not possible to organise a walkabout in the vicinity of the school, you can organise it within the school, exploring all the spaces where food is produced/sold/consumed. For example: school buffet, school canteen, spaces where students have their lunches, etc. Students can work in teams and explore what kind of foods are being served/sold/eaten. What patterns do they see in terms of health & sustainability? What stake-holders can they map who are involved in the foodscape? What opportunities for innovation are there? What is missing? As a last step, they can vision a healthier/more sustainable foodscape. How would it look? They can express their vision through any kind of art they choose. For inspiration, they can look at the videos about other school foodscapes in the additional resources.

Examples for foodscape maps

The two illustrations show examples of maps. This can be a cartographic approach in which the foodscape is looked upon as a space in which food, people and environment interact. In the first figure, the mapping was applied to a local canteen and in the second to the local neighbourhood. Both examples used the idea of the Customer Journey Mapping, which is when you "walk as a customer". The ideal map contains routes where you walked or where you could be walking as well as the places of interest in a food context. Most importantly, the ideal map identifies action possibilities in the environment. What could be improved?



Where would there be innovation possibilities?

Naturally, any other approaches to the foodscape maps are also acceptable.

Additional resources:

Do you want to know more about "the art of promenading" – the form of insight you can get about urban spaces – and their potential for being improved? To understand more about the history of "promendalogy" or "Strollology", or, as they say in German, '*Spaziegangswissenschaft*', Explore the resources below:

Urban foodscape development and participatory methods

See more about the Customer Journey Mapping (CJM) approach

Foodscape Studies - A powerful tool to improve our understanding of the impact of food environments on behaviour

School Food for the Future

Module: Exploring Food Systems
Type of lesson plan: Field work, Discussion

Short description of the activity:

Food at school is increasingly on the agenda in discussions about future food systems. Different schools around the world are seeking ways to improve the eating behaviour of their students whilst at the same time contributing to more sustainable school food systems.

There are schools across the world focusing on school lunchrooms, educating cafeteria workers in nutrition and cooking, and also working to bring more fresh, locally sourced foods into cafeterias. Other schools are working towards banning sugary drinks and snacks from vending machines and introducing 'healthy snack' policies.

The aim of this lesson plan is for the students to explore the topic of the food sold in their own school and also think about education and career opportunities that are related to food at school. Students should walk away with an understanding of the importance of food eaten at school, how they could have an impact through their professional lives, and what educational requirements there might be to pursue a career in that field.

Students will:

- Describe the importance of healthy and sustainable school food
- Describe how school food is connected to the Whole School Approach framework
- Recognise changes that can be made to move towards more sustainable school food systems
- Recognise how food at school could be seen as a business and a career path.

Duration:

2 classes/sessions of 45 minutes each.

Preparation time:

Medium

Can be aligned with the following subjects:

Home Economics

Lesson A

Duration	Activity	Materials/Equipment (download here)
15'	Introduction to school food	Video: Presenting the Schools Meals Coalition-Nutrition, Health and Education for Every Child (3:40)
15'	Whole School Approach (WSA) and school food systems	WSA PowerPoint
15'	Group formation and distribution of roles/tasks for mapping out the current school food system	

Lesson B

Duration	Activity	Materials/Equipment (download here)
20'	Groups present their findings	
20'	What can be changed in the current school food system? What food professions can be involved?	Plenary guided by teacher
5'	Closure and wrap-up	Led by teacher

Detailed instructions

Lesson A

Introduction to school food

The teacher starts the lesson with a video about school food:

Presenting the Schools Meals Coalition-Nutrition, Health and Education for Every Child

The teacher initiates a discussion about the food eaten and sold in school. The teacher asks questions to the students to guide the discussion:

- What were your initial thoughts about the video?
- In your opinion, is school food important? For what reasons?
- What kind of foods do you buy at school?
- What do you think about these foods? Are they healthy? Are they environmentally sustainable?
- What do you know about the history of school meals in your country?
- How could school canteens help the local food economy? Do they create any jobs? What kind of jobs?

The teacher explains that each country has a different school food system: in some countries there might be just a canteen (or even just vending machines) that sells food, in other countries there might be a kitchen where food is cooked and offered to kids as school lunch, in other countries there may be none of the above and children just eat what they bring from home. The teacher explains that whatever the case, school food is an issue that affects the health, food literacy and academic performance of students as well as the environment and is therefore a very important topic to be analysed and discussed.

Whole School Approach and School Food Systems

The teacher introduces the Whole School Approach (WSA) to the students. The teacher explains to the students that the WSA is a thinking tool/framework that schools can use to integrate sustainability issues into the school organisation and life. This can be done through active involve-

ment and commitment of all stakeholders in a school: school administration, teachers, students, parents, local community members.

The teacher presents the WSA flower model and explains the different components of it (PowerPoint presentation).

After that, the teacher asks the students to consider where they can see connections between this WSA framework and school food. For example, food canteens, kitchens, school lunchrooms, school gardens are all school areas that fall under the operations within the school and can act as learning environments on sustainable nutrition for the students. Furthermore, within the school's local community there can be food producers/ farmers/ restaurants who can collaborate with the school in various ways: through providing local, seasonal food to the school, opportunities for education to the students, etc.

Group formation and distribution of roles for mapping out the current school food system

The teacher asks the students to form groups of 4-5. The teacher assigns each group with a task. They can complete this task in their free time (and before the next lesson) by talking to the relevant people at the school. They will present their findings at the next lesson. Suggested tasks are:

- What does the school canteen sell to the students? (focus on types of foods, e.g. healthy, organic, conventional and their sources, e.g. local, regional)
- What does the school kitchen serve to the students? (types of foods, organic or conventional, locality, any collaboration with local producers)
- What is sold in the school vending machines? (make observation of foods in vending machines)
- What do students bring from home to eat? (ask other students about this)
- What kind of professional activity is present around the current school food system? (understand what types of jobs are involved)

Lesson B

Groups present their findings on mapping their school food system

Each of the groups presents their findings on the mapping of the school food system. The teacher requests that while a group is presenting, the others can think about and take notes on the following:

a) what kind of changes are needed to reinforce sustainability in the school food system

b) what kind of careers and professions could contribute positively to such changes (within the school, within the school environment, etc)

c) what future possibilities in terms of professional development are there for the students.

What can be changed in the current school food system? What food professions can be involved?

Students firstly share their thoughts about potential changes towards a more sustainable school food system. There is a discussion about how they could be involved to have an impact on the school food system as professionals. Which jobs seem attractive to them? Do they have any ideas for future jobs that they would like to do?

Closure and wrap-up

Guiding questions could be:

- How do you think the current school food system influences your food choices?
- If you wanted to eat healthier, contribute to sustainability and support the local food economy, what changes could be made in your current school food system? Which professions would be involved in such changes?

Additional resources

Why is school food so talked about?

Is there a school food revolution in progress? Ever since the UN Food Systems Summit, school food has been talked about as a lever of change towards more just and sustainable food systems. Recently, the School Meal Coalition was created as a world wide alliance to improve school food.

School food cultures around the world

How does the task of keeping kids happy and not hungry during a long school day differ in different countries? The following list of videos can be used as inspiration and as resources for group work where kids discuss school food practices at their school and contrast them with the situation in other parts of the world:

- School food Finland
- Why Finland's schools outperform most others across the developed world
- Swedish School meals Safari Hasslo School Restaurant
- Feeding the future: Brazil's school-lunch program nourishes kids and farmers

Why can school food be economically beneficial?

Beyond helping children directly, the OECD suggests investing in school food has other benefits[10]. Food at school creates business opportunities in the local community. Integrating school food in teaching and learning activities can be a way to achieve sustainability goals by advancing knowledge and skills. Providing food for children also has a clear food security dimension.

The Whole School Approach (WSA)

The WSA is increasingly discussed as a means for performing outreach, creating networks and encouraging collaborations with their community. School food can be seen as an important part of the local community's food ecosystem. Utilising the WSA can contribute to not only food security and academic achievement, but also to reaching sustainable development goals and improving livelihoods in the local area. This video shows one of the researchers involved in R&D in relation to transformative learning for sustainability through this approach.

Whole School Approaches to Sustainability: Exemplary Practices from around the world

How the quality of school lunch affects students' academic performance.

[10] Child empowerment, well-being, and inequality.

Challenges and opportunities in the food system

Module: Exploring Food Systems
Type of lesson plan: Theory, Discussion

Short description of the activity:

Students learn about the challenges in the food system and brainstorm about professions that can find solutions to these challenges.

Students will:

- Investigate various food system challenges
- Explore career opportunities that support solving food systems challenges.

Duration:

45-90 minutes

Preparation time:

medium

Can be aligned with the following subjects:

Biology, Ethics, Economics

Duration	Activity	Materials/Equipment (download here)
10'	Warm-up discussion: what is food security?	Whiteboard
10'	Group discussion on food security and challenges I	World Summit's quote (see in description)
15'	Group discussion on food security and challenges II	Food System Challenges - handout Agrifood Career list
10'	Harvesting & closing	Whiteboard

Detailed instructions:

Warm-up discussion

Students discuss what the term "food security" means. The teacher can write some of the answers on the whiteboard. When the discussion comes to a halt or when time is up, the teacher can show (it is best to have it written or projected) the World Food Summit's definition from 1996.

"Food Security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life."

Group discussion on food security and challenges I

Based on the above quote on food security, students discuss in groups of 5 whether there is food security in their country or not.

Guiding questions:

- Based on the quote, is there food security in your country?
- What could be the main obstacles for food security? Can you come up with examples?

When time is up, groups refer back to the teacher in a plenary on what challenges they discussed.

Group discussion on food security and challenges II

Each group receives a challenge from the Food System Challenges handout and a Food Career list. They have 15 minutes to read the challenge and then answer the guiding questions listed after each challenge:

- How is your country affected by this challenge?
- What solutions are there for this challenge?
- What kind of jobs can help solve this challenge? (explore the Food Career list, and you could also do some online research)
- Which of these jobs would you be interested in and why?

Closing

Groups present their challenge briefly and their answers to the guiding questions. Other groups listen and can add possible job opportunities that were not mentioned. The teacher writes all 5 challenges on the whiteboard and lists possible jobs underneath.

If there is time, students can vote for the jobs they are most interested in. This gives the teacher an overview on which areas the class is interested in in general as well as specific students' interests.

For homework & next class (optional)

- What is missing from the quote about food security?

Teacher and class can discuss in the next class the quote on food integrity, which was created as an addition in 2020 by Christopher Elliot from Queens University Belfast, focusing not only on safety, accessibility, and nutrition, but also on sustainability and ethics.

"Food Integrity exists when all people, at all times, have access to food which is safe, authentic and nutritious. The systems used to produce the food are sustainable, ethical, respect the environment and protect the human rights of all workers."

For homework, students can also be asked to research the jobs they chose more thoroughly.

Additional resources:

Connecting the dots - the complexity of food systems (video).

How to make a chicken happy? Regenerative vs. conventional agriculture

Module: Exploring Food Systems
Type of lesson plan: Theory, Case Study, Discussion

Short description of the activity:

In the first class, through a case study of a regenerative farmer, students learn about the differences between conventional and regenerative farming. They discuss the effects of regenerative farming on animal rights, soil quality, customer satisfaction and the livelihoods of farmers.

In the second class, students learn more about regenerative farming, including its main practices along with its advantages and disadvantages.

Students will:

- Acquire knowledge on regenerative farming
- Compare conventional and regenerative farming
- See new perspectives on farming
- Practice systems thinking in terms of agriculture.

Duration:

45-90 mins

Preparation time:

medium

Can be aligned with the following subjects:

Biology, Geology

1st Class: A Happy Chicken Farm

Duration	Activity	Materials/Equipment (download here)
10'	Warm-up discussion	
15'	Guided video watching: A Happy Chicken Farm	Video: A Happy Chicken Farm (12:52) A Happy Chicken Farm: Guided questions
15'	Harvesting	
5'	Closing	

2nd Class: Conventional vs. Regenerative Agriculture

Duration	Activity	Materials/Equipment (download here)
10'	Warm-up: Summary of the insights from the Happy Chicken Farm video	
6'	What is regenerative agriculture? (videos)	Video: What is regenerative agriculture? (3:30) Video: Regenerative organic certification (2:35)
15'	Group work	Can regenerative agriculture replace conventional farming? Handout
14'	Harvesting & discussion	

Detailed instructions:

1st class: A Happy Chicken Farm

Warm-up discussion

The teacher discusses meat eating habits and chicken farming with students.

Guiding questions:

- Who likes chicken meat?
- What chicken meat products do you eat? How do you eat chicken meat?
- What do you know about how chickens are raised?
- Why are chickens raised like this?
- Can you imagine a better way to raise chickens?

The teacher can show photos of conventional chicken farming (choose photos you like from Google search).

Video watching

First, the teacher explains that students will watch a video that shows an alternative to conventional chicken farming. Students are divided into 3 types of groups (containing 4-5 students), with each type of group receiving guiding questions about the video.

Students should watch the video and find the answers to the guiding questions.

Group type 1:

Topic: Conventional vs. regenerative agriculture

- What is the biggest difference in how chickens are raised and kept in conventional vs. regenerative farming?
- What is wrong with the current model?
- What possible solutions are there?
- How is regeneratively produced meat different from conventional meat?
- What is the farmer's perspective on animal rights?

Group type 2:

Topic: Effects on the soil

- Why are they moving the chickens' houses? How often do they do it?
- What is the effect of this on the soil? What are the three advantages?
- How is the farmer demonstrating the regenerative impact of his farming methods?

Group type 3:

Topic: Regenerative systems

- How is the chicken farm related to the timber farm?
- How is the chicken farm related to the grass?
- What is the similarity between the regenerative farming of chicken and cattle?
- What are regenerative farming's benefits to the farmer?
- What are regenerative farming's benefits to the chickens?
- What are regenerative farming's benefits to the consumers?

Harvesting

Groups summarise their findings according to the guided questions.

Closing

Teacher discusses how students liked the video and the associated concepts.

Possible questions:

- Who would like to be a farmer? Why? Why not?
- What did you like most about this video?
- Which would you rather do? Conventional or regenerative farming?

2nd Class: Conventional vs. Regenerative Agriculture

Warm-up: Summary of the insights from the Happy Chicken Farm video

The teacher summarises with students the key insights from the previous class, focusing on the differences between conventional and regenerative agriculture. The teacher creates a list on the whiteboard of the differences students can pinpoint so far.

What is regenerative agriculture? (videos)

Students watch videos on regenerative agriculture.

Group work

Students are divided into 4 groups and create a short summary with the help of the handout "Can regenerative agriculture replace conventional farming?" on the following topics:

1. Basic principles of regenerative farming
2. Regenerative agriculture and yields
3. Advantages of regenerative agriculture
4. Disadvantages of regenerative agriculture.

Harvesting and discussion

The teacher and students discuss what new insights they gained from the handout. What was surprising? What was new information? What is necessary for regenerative agriculture to become mainstream? How does it change old jobs in agriculture? How does it create new jobs?

Optional homework:

Students can create an awareness campaign on regenerative agriculture using any artform.

Additional resources:

The regenerative agriculture revolution

Digging up the dirt: could soil contain the answer to food shortages?

Climate-friendly almond farmers coax life from drying Spanish soil

Keeping our planet healthy

Regenerative—Not 'Climate-Smart'—Agriculture Needed to Feed the World and Cool the Planet

Agrifood jobs and careers

Agrifood jobs and careers

Understanding and being able to distinguish between the different profiles that are part of the agrifood industry, whilst also identifying the skills and knowledge required in this sector, can be key to recognising how each student can find their career path in this field. Accordingly, the lesson plans of this module support the discovery of agri-food careers and also offer a chance for self-reflection with testing and matching of the students' skills and interests with different professions.

The activities proposed in this module range from describing and listing some of the functions of the many professions in the food sector, to the description of the food professions involved in the production of simple processed foods, to the classification of food professions at the different stages of the food chain. The methodological proposal is based on a different approach rooted in teamwork, role-playing and activities that encourage participation, communication and fun learning.

Learning objectives:

Students will:

- Identify various professions in the agrifood sector
- Recognise that many different and interrelated food professions are involved in the production of the processed food we eat.

Lesson plans on Agrifood Jobs and Careers:

1. **Mix & match world of food professions:** identify various professions in the food sector
2. **Agrifood career adventures:** explore further professions in the food sector
3. **The jobs behind a bag of chips:** recognise the interlinked nature of different food professions that are involved in the production of the processed food we eat
4. **Food career guessing game:** learn about food careers in a fun way and discover the wide variety of options in the agrifood job market.

Mix and match world of food professions

Module: Agrifood Jobs and Careers
Type of lesson plan: Games/Simulations

Short description of the activity:

The food system involves many different professions, from primary production in the field, to distribution, consumption, and disposal. Daily life in each food-related profession is different and unique, with various skills and duties required. This activity will focus on seven food-related professions: farmer (in animal production), nutritionist, food quality controller (in a meat factory), communications manager, operations director (in apple production), mechanical engineer (in fish cultivation) and a start-up founder.

Students will:

- Be able to describe and list some of the duties for seven professions in the food sector
- Get familiar with the food industry careers
- Learn what skills and knowledge are developed through the different careers in the food industry.

Duration:

45 minutes

Preparation time:

Short

Can be aligned with the following subjects:

Career Vocation

Duration	Activity	Materials/Equipment (download here)
10'	Quick introduction to activity - Preparation of cards (name, description, 3 duties for each profession)	21 cards: 7 NAME-cards 7 DESCRIPTION-cards 7 DUTIES-cards 7 videos: A day in the life Mobile phones of the students
10'	Mix and match game	
10'	Learnings and impressions	7 videos: A day in the life Mobile phones of the students
15'	Group presentations of professions	Completed cards (model answer)

Detailed instructions:

Quick introduction to activity - Preparation of cards (name, description, 3 duties for each profession)

The teacher explains to the students that this lesson is about 7 food related professions, what they do, and their role in the food system.

The teacher divides the students into 7 teams. Each team is given a set of three empty cards: 1 NAME-card, 1 DESCRIPTION-card and 1 DUTIES-card. Each team is given also the QR code for one of the 7 videos. Each team is then asked to watch the video and complete:

- the name of the profession the video was about (on the NAME-card)
- the description of the profession the video was about (on the DESCRIPTION-card)
- 3 duties involved in the profession in the video (on the DUTIES-card).

Mix and match game

When the students are finished, the teacher collects all 21 cards and mixes them up. The teacher re-distributes the cards to the students, giving one card to each student (if there are more than 21 students, then 2 students can share one card). The teacher makes sure each student receives a different card than the one he/she created during the group work.

Each student is asked to walk around in the class looking for his/her two classmates who match his/her card. For example, the student who is given the NAME-card with the name FARMER on it, should look for: a) the student who has the DESCRIPTION-card for FARMER and b) the student who has the DUTIES-card for FARMER. The same applies to all the students. When all matches are found, there will be 7 new groups of 3 (or more) students.

Learnings and impressions

Each group is then asked to watch a 2nd video of the profession on their cards (different video to the one they watched at the beginning) and prepare a 1-minute oral presentation. The presentation should contain: the name and description of the profession, 3 of its duties and 1 element that the group found interesting about that profession.

Group presentations of professions

Each group presents the profession they analysed to the rest of the class. After each 1-minute presentation, there is a discussion on various points that the students find interesting. The teacher can use the 'model answer' completed cards to supplement the information given by the students (note: the model cards contain guiding answers in relation to the discussed professions).

Variation

If the teacher would like to have more groups, here are videos for 3 more professions that could be used.

Agricultural inspector career video

A day in the Life of a Food Technologist

Agronomist

Additional resources:

Agrifood Careers List

Agrifood career adventures

Module: Agrifood Jobs and Careers
Type of lesson plan: Games/Simulations

Short description of the activity:

During the class, students will learn about different professions related to the food industry, alongside the skills and career opportunities they involve. The experience of people already working in these fields can provide an example and motivation for the students to pursue these careers at university and beyond.

Students will:

- Explore different careers related to the agrifood industry
- Get insight on how jobs are interrelated in the agrifood industry.

Duration:

90 minutes

Preparation time:

Short

Can be aligned with the following subjects:

Ethics, Science

Duration	Activity	Materials/Equipment (download here)
10'	Warm-up: present food careers materials (cards)	Agrifood Career List
20'	Depends on the activity/role-play variation selected	A) Agrifood Career List, post-it notes and a Mural. Each career could be placed in a separate card/ sheet as a material and let the students evaluate them and choose between them. B) Agrifood Career List, post-it notes and magazines or computers if they will present it with digital resources. Each career could be placed in a separate card/sheet as a material and let the students evaluate them and choose between them.
5'	Present the 2nd class for next day (1 week)	
2nd class: Interview today		
40'	Plenary session with the presentation of the research and interviews.	Depends on the way that they want to present the interview (zoom, video, mural...) C) Agrifood Career List, post-it notes and magazines or computers if they will present it with digital resources. Each career could be placed in a separate card/sheet as a material and let the students evaluate them and choose between them.
10'	Closing round	Post-it notes for the final feedback

Detailed instructions:

This is a food career role-play game. Two different options can be used, which are followed by a homework task preparing an interview to be shared with the class. The two role-play variations are as follows:

Optional activity 1: Heart, hand and mind

1. Presenting food careers materials: present cards and discuss what kind of agrifood careers students know about

2. Split into groups and choose a card

3. Closing round.

After the groups select food careers, they choose one of them and:

1. Explore it using these three lenses:

   - Mind: What makes it logical and sensible?
   - Heart: What makes it emotionally engaging? How do you feel about this job?
   - Hand: What makes it tangible and practical?

2. List the characteristics or features of the job that appeal to each lens

3. Score the categories from 1 to 10. Evaluate strengths and weaknesses.

4. Present to the whole group.

Example:

FARM MANAGER

MIND	❑ Deciding on important issues like the type, quality and quantity of the crops to be planted.
HEART	❑ Being in contact with the primary sector, plants or animals and in a healthy environment. ❑ Reconnect with the origins.
HAND	❑ Managing Budgets and sales and marketing of farm products.

The idea is to use these three lenses that could appeal to a whole person "heart, hand, and mind" as a means of finding, clarifying, or diagnosing the strengths and weaknesses of each food industry job.

The Heart, Hand, Mind game was inspired by Swiss educational reformer Heinrich Pestalozzi.

Optional activity 2: 10 reasons why

1. Presenting food careers materials
2. Split by groups and choose a card
3. Closing round.

After choosing a food career in small groups, they will have to prepare a pitch presentation giving: **'10 reasons why...', answering the question:** why work in this profession?

These reasons could include things such as:

1. Companies to work with
2. Skills to develop: e.g., you will have the opportunity to design new food products for…
3. Career prospects
4. Room for new talent
5. Typical day in the life
6. Environment
7. Average salary
8. Equal representation
9. VIP that they know in this profession
10. How can these professions help the sector to be more sustainable?

Students could use pictures to create a collage or attractive presentation to pitch this job to the rest of the students.

After the presentation of the food careers materials, splitting into groups and choosing a food career, the class will have one week of research to prepare an interview with one person working in the food industry.

Optional activity 3: Interview today

This will be the **plenary session** with presentations of the research and interviews.

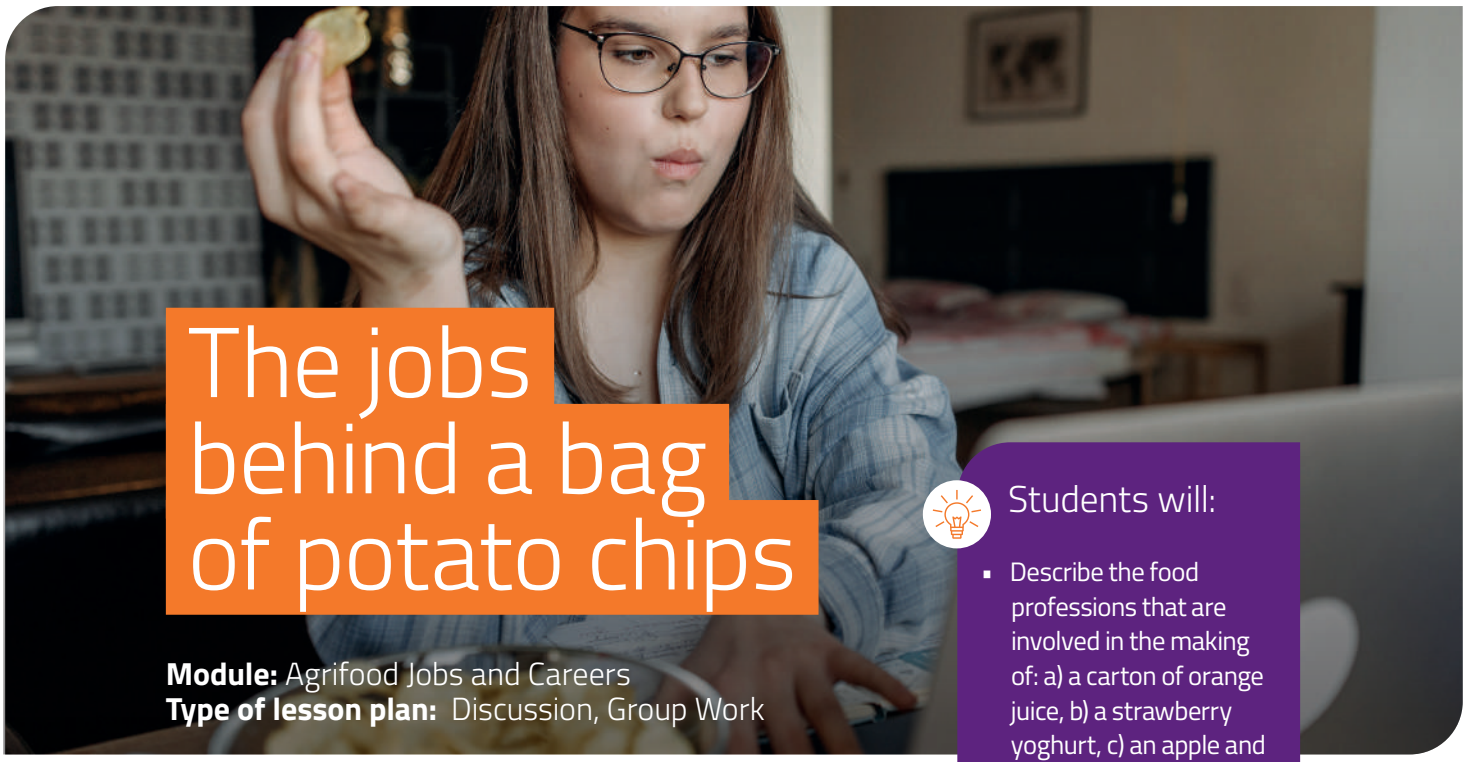
Firstly, an introductory session takes place where all the food career profiles will be presented.

Next, in small groups students will choose one food career and spend one week researching it and finding a person to interview. The interview could be recorded or conducted in the plenary session (e.g. by Zoom). This interviewee could be someone who is studying towards the career or someone already working in the industry. They will have to prepare the interview questions in advance, ensuring they have all the necessary information to maximise the interview's effectiveness.

In the plenary session, all the research and interviews will be presented.

Additional resources:

Day in the Life career videos



The jobs behind a bag of potato chips

Module: Agrifood Jobs and Careers
Type of lesson plan: Discussion, Group Work

Short description of the activity:

The production of processed food involves many different food related professions. To summarise, farmers are responsible for the production of the raw materials (plant or animal-based production). These raw materials are then processed in a food processing plant and converted into a different food product. In this processing stage, many different roles are involved such as food scientists, food production managers, engineers, marketing experts and so on. After a product leaves a processing plant to be distributed, professions such as retail managers, restaurant managers, and chefs play a significant role. Professions such as food policy makers, food historians, food photographers and so on also have a position in the complex contemporary food system.

This activity aims at making students start thinking deeply about food products in relation to the food-related professions that contributed to its manufacture and sale. In this way, they will become more aware of the wide range of food-related professions.

Students will:

- Describe the food professions that are involved in the making of: a) a carton of orange juice, b) a strawberry yoghurt, c) an apple and grape snack bag and d) a ham and cheese sandwich
- Classify the different food professions in the different steps of the food chain
- Think about how to make food products healthier and more sustainable.

Duration:

45-90 min

Preparation time:

low

Can be aligned with the following subjects:

Biology / Chemistry / Home Economics / Environmental Education

1st class: The jobs behind a bag of potato chips

Duration	Activity	Materials/Equipment (download here)
5'	Introduction to the three levels of the food system (primary production, secondary production and distribution/selling) as well as to a fourth supporting category: professions.	
10'	Example: A bag of potato chips and its associated professions	A bag of potato chips (natural)
20'	Ham and cheese activity	A carton of orange juice A strawberry yoghurt An apple and grape snack bag (or another combination if this one is not available) A ham and cheese sandwich Activity sheet Handout: Agrifood Career List
10'	Comparison of results and discussion	

2nd class: Innovating food systems

Duration	Activity	Materials/Equipment (download here)
5'	Warm-up	
15'	Innovating food systems 1	
15'	Food of the future	
10'	Presenting food of the future, voting and closing	

Detailed instructions:

1st class: The jobs behind a bag of potato chips

Introduction to the three levels of the food system (primary production, secondary production and distribution/selling) as well as to a fourth supporting horizontal category of professions.

The teacher explains to the students how the food system can be broken down into four segments:

1. Primary production: the production of agricultural products on the farm (fruits, vegetables, meat, milk, etc.)

2. Secondary production: the processing of those agricultural products into processed foods

3. The distribution and selling of all foods (agricultural and processed)

4. The supporting sector which horizontally supplements the other 3 vertical sectors.

The supporting sector includes food policy making, food law, food history, food control and inspection, and many other roles.

Example: A bag of potato chips and its associated professions

The teacher makes four columns on the board: the first column is titled 'Primary production', the second 'Secondary production', the third 'Distribution/selling' and the fourth column 'Supporting professions'.

Then the teacher shows the students a bag of potato chips (natural) and asks them to brainstorm the professions that they think contributed to the production of this product. The teacher writes the professions in the correct column on the board. The student who mentions a profession is asked to further elaborate on that profession (if they can) in relation to its role and some of its duties.

Ham and cheese activity[11]

The teacher writes the following four food products on the board:

1) a carton of orange juice

2) a strawberry yoghurt

3) an apple and grape snack bag

4) a ham and cheese sandwich

The teacher divides the class into 4 teams. The four food products are shown in turn to each team. Each team is given 5 minutes to list as many jobs they can think of that are involved in the production of that particular product. Each team lists their responses in the activity sheet.

The teacher gives the students the handout (Agri-food Career List) which they can use if they need inspiration.

Comparison of results and discussion

Each team presents the work done.

The teacher lists the number of different food professions each team managed to list in total (for all four products). The team with the highest number is the winner.

Guided questions for closing:

- Which of these jobs are completely new to you?
- Which jobs would you be interested in?
- Which one is the hardest/easiest in your opinion?

2nd class: Innovating food systems

Summarising what was learnt in the first class: primary, secondary, tertiary sectors, jobs belonging to these sectors, etc.

Innovating food systems 1

Class is divided into groups of 4-5, each group receiving the task of brainstorming about one of the following products:

1. A bag of chips

2. A carton of orange juice

3. A strawberry yoghurt

4. A ham and cheese sandwich

Guiding questions (teacher can show these on a slide):

- What do you like most about this product?
- What do you like the least about this product?
- Is this product sustainable?
- Is this product healthy?
- What should be changed in order for this product to become healthier and more sustainable?
- What variations of this product can you imagine that would be healthier and more sustainable?

Food of the future

Based on the previous brainstorming sessions, students visualise a more sustainable and healthier version of their food product. They can draw it and create a list of ingredients before presenting it to the class as if they were running a marketing campaign or pitching to investors. Students can vote on which new product they would actually buy.

Guiding questions:

- How is the new product different from the old version? How is it more sustainable and healthier?
- Who would buy it and why?
- What new jobs does its production create?
- Where would you sell it?

After the voting, the teacher closes the class asking about their overall insights and learnings.

Additional resources:

The food system

Difference between primary, secondary, and tertiary sectors and their comparisons

Conceptualising food systems for global environmental change research

Food Career Guessing Game

Module: Food System Careers and Jobs
Type of lesson plan: Role Play

Short description of the activity:

Students learn about food careers in a fun way and discover the wide variety of options on the agrifood job market. One variation is a guessing game, the other is a networking role play.

Students will:

- Explore the diversity of jobs comprising the agrifood sector
- Understand how these jobs are interrelated.

Duration:

45 minutes

Preparation time:

short

Can be aligned with the following subjects:

Ethics, Career Vocation

Duration	Activity	Materials/Equipment (download here)
10'	Warm-up discussion	
10'	Getting to know food careers	Agrifood Career List
15'	Guessing game	
10'	Discussion & closing	

Detailed instructions:

Warm-up discussion

Guiding questions

- Who already knows what kind of profession they want to pursue? (Teacher finds out what kind of topics/industries/professions students are interested in and notes whether there are any in the agrifood sector)
- Who knows what kind of jobs there are in the agrifood sector? (Teacher explores how many agrifood jobs students are familiar with).

Getting to know food careers

The teacher gives out the List of Food Careers as a handout. Students read the list in groups to familiarise themselves with the jobs on it.

Guessing game

After taking the lists back, the teacher puts a sticky note with a profession written on it on the back of each student (if there are more students than professions, then more students will have the same profession). The task is for students to go around and find out what profession they are.

Rules:

- Find out what profession they are by going around the class asking questions to others
- They can only ask one question per person (if they run out of people, then they can ask the same people again)
- They cannot tell anyone else what profession they are - they have to guess it
- Don't peek at their own post-it!

Variation: Networking role play

- There is a new superfood product on the market, a protein bar made of fish and grain targeting students preparing for their exams, based on an old recipe that has been modernised. The company, FishProBar, asked the most important players to have a networking brunch together to discuss the success of the product after the first round of marketing and sales campaigns. There is also an issue around a competitor who wants to copy the product. The task is for others to find out what an individual student's role was in launching this new product - for this, they walk around the classroom talking about the product, themselves and what type of tasks they did without being too specific or mentioning their professions directly. See how many other students can uncover each other's professions.

- Before they start moving around, students should take 5 minutes to build up a character: imagine what their day looks like, what kind of habits they have, what their name is, etc.

Discussion

- What was your profession in the game?
- Would you be interested in pursuing that profession? If yes, why? If not, why not?
- What other agrifood professions would you be interested in? What can be the main challenges and perks of those jobs?
- In your family/friends' family or network, do you know anyone pursuing an agrifood career? If yes, what kind of jobs do they have? Would you choose their jobs?

Homework (optional)

Do research around the profession you like the most. What qualifications are needed? What is the average salary? Can you find any significant individuals in that profession? Who are they? Check their social media - how does their life look from the outside?

Additional resources:

A Day in the Life videos

Top 10 Highest-Paying Careers in Agriculture

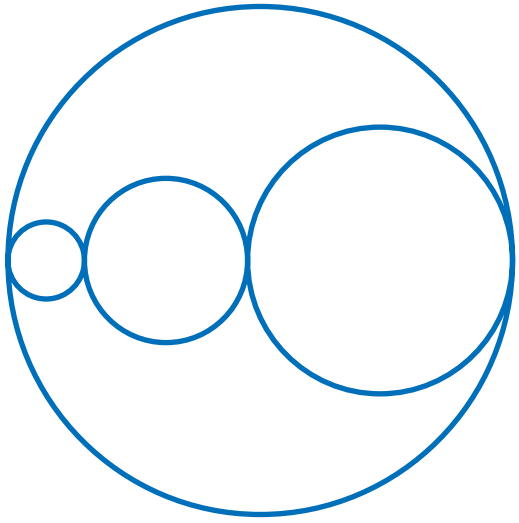
Tasty Careers in food & drink

Food Science and Entrepreneurship lesson plans

Food Science and Entrepreneurship

The road to sustainability must include food system transformation. Consumers are increasingly looking for food products that are more sustainable. The development of new food products is therefore very important yet complex.

Students should become acquainted with food-related professions that contribute to food system transformation. Food product development, such as foods based on plant-based proteins, entails deciding on ingredients, thinking about production processes, analysing nutritional content, evaluating sensory characteristics (e.g., taste, odour, flavour, texture) of the products, as well as its overall appeal to consumers. Once the food product is ready, marketing professionals need to think about the name, packaging, marketing strategy and launch of the new product in the market. In this module, students will deepen their understanding of these processes and discover the opportunities that are found in different food-related professions.



Learning objectives:

Students will:

- Explain basic science information about the production of plant-based milk
- Describe careers that relate to food innovation and entrepreneurship towards sustainability
- Recognise the importance of food sensory science in product development and sustainability
- Describe careers that relate to food sensory evaluation.

Lesson plans on food science and entrepreneurship:

1. **The amazing job of a food sensory scientist:** learning about the importance of sensory science and its role in food product development and sustainability
2. **Best plant-based milk competition:** learning about the basic process of alternative milk production
3. **Bring your plant-based milk to market!:** developing and marketing new food products and businesses to contribute to sustainable food systems.

The amazing job of a food sensory scientist

Module: Food Science and Entrepreneurship
Type of lesson plan: Discussion, Experiment

Short description of the activity:

Sensory evaluation of foods is used to provide useful information to product developers, food scientists and managers about the sensory characteristics of their products. Sensory food science is defined as a multidisciplinary discipline dealing with human sensory perceptions and responses to food, beverages and their components.

The first part of this lesson touches on the definition of sensory food science and its role in food development and sustainable food systems. The three main types of sensory evaluation will be explained and the connection and collaboration between different STEM professions will be discussed.

In the second part of the lesson, the students will carry out a discrimination test (triangle test). In relation to sustainable food systems, discrimination tests are used in industry and research for various reasons: to detect possible differences between organic and conventional foods, between meat and meat-free foods, or to detect any change in taste when an ingredient was substituted to make the final product more sustainable. Sensory scientists have an important role to play now and in the future in promoting food sustainability.

Students will:

- Be able to define food sensory science and sensory attributes
- Be able to describe its role in the development of sustainable food systems
- Define the collaboration between different functions needed in food sensory science
- Recognise the three main types of sensory evaluation
- Describe a triangle test in food.

Duration:

2 x 45 min

Preparation time:

1st class - Medium
2nd class - Long – see preparation details on experiment sheet

Can be aligned with the following subjects:

Physics / Chemistry / Biology / Mathematics

1st class: What is food sensory science?

Duration	Activity	Materials/Equipment (download here)
10′	Framing: what is food sensory science and in what way it is important in food development	Food Sensory Evaluation PowerPoint (slide 2)
10′	Some important points about sensory science and how STEM professions are involved	Food Sensory Evaluation PowerPoint (slide 3)
25′	Learning about the three main test methods in sensory evaluation (affective, discriminative and descriptive) through tasting Introduction to 2nd class (triangle test)	Orange juice, small paper glasses (1 glass for each student) Food Sensory Evaluation PowerPoint (slide 4-7) Video: Sensory triangle testing (2:47)

2nd class: Triangle test

Duration	Activity	Materials/Equipment (download here)
5′	Introduction to the triangle test - main guidelines given by teacher	
25′	Performance of triangle test amongst students (25-40 participants is a satisfactory sample)	Experiment sheet (for teacher) Record sheet (for student)
15′	Interpretation of results/conclusions	

1st class: What is food sensory science?

Detailed instructions:

Framing: what is food sensory science, why and in what way it is important in food development

(Slide 2) The teacher asks the students various questions to introduce the concept of food sensory evaluation and leads a discussion around it.

Suggested questions to be asked by the teacher: (targeted answer in brackets)

- When you buy a food product, what is important for you? (e.g., consistency in quality, taste, appearance, how it feels in the mouth, texture, smell, flavour)
- What do you think the food industry does to satisfy the expectations from the consumers in terms of how a product looks/tastes/feels in the mouth, etc.? (food sensory tests)
- When do you think a food industry performs sensory evaluation on its products? (e.g. a new product that is being developed, when an ingredient in the recipe or a production condition was modified, to compare their product with similar competitive products/brands)
- In what way do you think sensory food science can contribute to sustainable development in the food sector?

  Taste is the main criterion for consumers to eat a food product. So in the overall transition towards a more sustainable food system, new products and new processes that aim to contribute to sustainability are inevitably compared to conventional foods in terms of liking. In brief, sensory consumer science research streams that relate to sustainability are[12] :

[12]Aschemann-Witzel et al., 2019

a) Research on consumer reactions to foods regarded as sustainable (organic food vs. conventional foods, foods with sustainability labels or claims, insect-based food, meat replacements)

b) Research on sensory consumer behaviour contributing to sustainability (shelf-life identification and prolongation, increase in fruit/vegetable consumption, determinants of dislike of unfamiliar foods)

Some important points about sensory science and how STEM professions are involved

The teacher uses the presentation to transfer some specific knowledge to the students about food sensory evaluation.

(Slide 3) Sensory evaluation, because of its nature, combines knowledge from different STEM disciplines. What does this mean?

Sensory evaluation involves four activities: a) evoke (the senses - bring to conscious mind), b) measure, c) analyse the collected data, d) interpret data. Each activity uses techniques and knowledge from different STEM approaches as follows:

a) Evoke: A sensory scientist must understand food products and follow guidelines on preparation/serving the samples under controlled conditions: a) panellists placed in individual test booths (so that the judgements they give are their own and do not reflect the opinions of those around them), b) samples are labelled in random numbers (so that people do not make judgements because of the product label but rather on their sensory experience), c) products are served in different order to each participant (to counterbalance for the sequential effect of seeing one product after another), d) sample temperature, volume and spacing in time must be controlled (avoid unwanted variations)

b) Measure: Numerical data is collected from panellists tasting the food products. A sensory scientist must understand people as measuring instruments. Techniques used: techniques of behavioural research and experimental psychology in observing and quantifying human responses

c) Analyse: A sensory scientist must understand the methods of statistics used to analyse food evaluation data (to eliminate as much as possible unwanted variation due to natural differences between the panellists, e.g., mood, motivation, innate sensitivity to sensory evaluation, etc.)

d) Interpret: A sensory scientist must have the skills to interpret data within the context of research objectives.

Learning about the three main test methods in sensory evaluation (affective, discriminative and descriptive) through tasting

1. (Slide 4) The teacher explains that there are three different testing methods used in sensory food science:

   a) The hedonic test aims at answering the question 'How well are products liked or which products are preferred?'
   b) The descriptive test aims at answering the question 'How do products differ in specific sensory characteristics?'
   c) The discrimination test aims at answering the question 'Are products different in any way?'

2. Each student is given a small paper glass of orange juice.

3. (Slide 5) The teacher draws on the board a 1-5 Likert scale of preference. The teacher asks the students to taste the orange juice and to raise their hand if they disliked the orange juice a lot (point 1 of Likert scale). The teacher writes down the number of students who raised their hand. The teacher does the

same with the other points on the Likert scale. The teacher explains that they are now trying out the 'affective' test method (hedonic test) which aims at finding preferences and likeness.

4. (Slide 6) The teacher asks the students to taste the juice again and express specific sensory characteristics (adjectives) that they would use to describe the juice (e.g., sweet, smooth, sour, etc.). The teacher explains that this is the descriptive test method used in sensory evaluation which aims at describing foods to find differences in specific characteristics.

5. The teacher discusses with the students the third type of test method used in sensory evaluation – the discrimination method which aims at finding out if there is a detectable difference between two similar foods. The teacher asks the students to think of an orange juice they usually consume / or have lately consumed and compare it with the one given to them in class.

6. The teacher explains to the students that they will all try the triangle test in class using two different juice samples. The teacher shows the following video to the students to familiarise them with the test.

2nd class: Triangle test

Detailed instructions:

Introduction to the triangle test - main guidelines given by teacher

The teacher repeats that the test is done in order to see whether there is (or not) a significant difference between two similar foods. The idea is to give the panellists three samples – one sample from food A and two samples from food B. Then each panellist is asked to guess the different sample.

Performance of triangle test amongst students (25-40 participants is a satisfactory sample)

The teacher can follow the experiment sheet to prepare and carry out the experiment in class. Each student records their answer on the record sheet.

Interpretation of results/conclusions

The teacher records all correct and false answers and discusses the results with the students.

The teacher asks the students:

a) How do they see this sensory experiment being connected with STEM professions?

b) What did they like about this experiment?

c) What did they not like or find difficult?

Additional resources:

Sensory triangle testing

Triangle test explained / How to validate process changes

Best plant-based milk competition

Module: Food Science and Entrepreneurship
Type of lesson plan: Experiment

Short description of the activity:

Plant-based milk alternatives, like soy milk and oat milk, are increasingly popular across Europe. Many people prefer to have almond or coconut milk for their coffee or at breakfast, due to personal health issues such as lactose intolerance, their unique taste or perceived environmental benefits. But are those plant-based alternatives truly an alternative option to traditional dairy drinks? How are plant-based alternatives actually produced and what does that mean for their nutritional content?

Students (or student teams) will try to design their own plant-based milk alternative, including calculation of its rough nutrient content and price. Students then can compare the nutrient content to dairy milk and discuss the differences.

This lesson can be further extended by optional team competition, in which the students will try to bring their milk design to market and get support from investors!

Students will:

- Outline how to produce their own plant-based milk alternative
- Identify the crucial differences between plant-based milk alternatives and dairy milk
- State how different ingredients impact nutrient content
- Describe how to calculate nutrient content of food using available online databases.

Duration:

90-180 minutes (minimum of 2 classes are needed).

Preparation time:

Long (due to the need to pre-soak the ingredients)

Can be aligned with the following subjects:

Nutrition, Science, Maths, Cooking Class, Home Economics

1st class: Plant-based milk creation

Duration	Activity	Materials/Equipment (download here)
Pre-class	Soaking and measuring of ingredients	Selection of ingredients for plant-based milk (see Table of ingredients), plant-based calculation table for teacher, example tutorial
10′	Introduction	
35′	Plant based milk creation	Food processor, filter (French press or cloth), kitchen scale

2nd class: Calculating nutrient content and price

Duration	Activity	Materials/Equipment (download here)
30′	Calculation of nutrient content and price	Calculation sheet for students (laptop), online database/Table of ingredients
10′	Competition	
5′	Wrap-up discussion	

Detailed instructions:

Class 1:
Plant-based milk creation

Pre-class preparation

During the preparation for the class, it is necessary to weigh and pre-soak selected ingredients for the students. Using the basic recipe for plant-based milk and a table of potential ingredients, the teacher selects ingredients they want to offer the students. Weigh carefully the quantity for every ingredient and write it down. Let them soak in water overnight for 10-16 hours (exception: soybeans are cooked in advance, not soaked).

After soaking, discard the water and weigh the ingredients down. Write the "after soaking" weight in the pre-prepared table for teachers. The table should calculate the soaking factor automatically, by dividing the after post-soaking weight by the weight of dry ingredients.

Note: If using online food databases, search for the nutrient content in the selected ingredients in advance, to print them for students. Similarly, if students are to do the calculations by hand, the table/tutorial must be printed for them.

Introduction

Ask students:

- if they have ever tasted any plant-based milk, what type they had and if they like it
- if they are regularly buying plant-based milks for home and why
- If they ever tried to prepare any kind of plant-based milk at home. If so, let them briefly share their experiences
- If they think plant-based milk has the same nutrient content as dairy.

Explain to them that plant-based drinks are increasingly popular in Europe. Many people prefer plant-based drinks over dairy because they believe they are more environmentally friendly or healthier. A growing number of companies are therefore trying to produce their own brand of plant-based milk, with some being launched by big corporations, and others produced by smaller, local manufactures (the teacher could research some local examples or statistics from their own country or region).

Explain to students that during this class they will turn into plant-based milk producers, as they will try to design their very own plant-based milk. Their task will be not only to find the tastiest combination of ingredients, but also to calculate the nutritional content of their milk and compare that to dairy. Give students the Basic Tutorials for plant-based milk.

Plant-based milk creation

Briefly explain the process for plant-based milk creation and introduce them to ingredients available (there is also a video tutorial with an example of alternative milk production, see below). For plant-based milk creation, students will need kitchen scales to weigh the ingredients, a food processor or blender (a basic model should be sufficient to process pre-soaked ingredients) and some "filtration system" (French press or clean cloth) along with bowls and/or flasks for the milk.

Instruct the students to carefully weigh the ingredients they are selecting for their milk recipes and write the exact weight in the pre-prepared table. Give students time to experiment, individually or in teams (based on an amount of available ingredients and equipment).

Class 2: Calculating nutrient content and price

Using prepared calculation tables, instruct students to try to calculate the nutrient intake in their plant-based milk recipe. Students can be instructed to look for the nutrient content of ingredients on the internet (in freely available nutritional databases or phone apps) or they can be offered the pre-prepared table with the nutrient content of selected ingredients.

Extra task: They can search for the usual price of the ingredients and average rates of hourly pay and try to calculate the cost of production for their milk. Compare the results with dairy milk and dairy milk alternatives of their choice. They should be encouraged to think about possible reasons for the price difference.

Adaptation for younger students: calculations can be difficult for younger pupils. For simplicity, you can try to use this online calculator (with only a limited amount of ingredients available and no functionality to adjust for the amount of water used) or skip the calculation entirely and just let the students enjoy the original taste of their very own product!

Best plant-based milk competition

Let the students have some fun! They can prepare tasting samples of their milk and let the class vote for the tastiest product. Other award categories could be offered:

Cheapest milk
Most luxurious (most expensive)
Highest amount of protein
Highest amount of healthy fat
Highest amount of calcium
Low calorie milk
Plant-based milk with the weirdest colour
Best smelling milk
...and others based on the teacher's imagination.

Wrap-Up Discussion

Discuss with students what they took from the class. Discuss differences in nutrient content of dairy and plant-based milks. What kind of nutrient showed the greatest differences? How can they improve the content of these nutrients? (e.g. fortification of plant-based drinks).

Bring your plant-based milk to market!

Module: Food Science and Entrepreneurship
Type of lesson plan: Experiment, Class Discussion

Short description of the activity:

Product creation is not enough to succeed in the competitive food market. In this activity, teams of students will try to get their very own milk alternative on the market. They will need to decide which alternative they are going to launch on the market, brainstorm their name, slogan, basic design of their package and plan their marketing strategy. Finally, they will be required to deliver a 5-minute pitch on their product to potential investors: their classmates.

Students will:

- Improve their communication and teamwork soft skills, including work under time-pressure
- Learn more about stages in food product development, including marketing strategies
- Practice their presentation skills.

Duration:

90 minutes

Preparation time:

Short

Can be aligned with the following subjects:

IT, Language Arts, Economics

Duration	Activity	Materials/Equipment (download here)
5'	Introduction	Strategy template to distribute among students
40'	No-milk startup teams	Computer/ paper and stationary
40'	Present your startup: pitch decks	Projector (in case electronic presentations are used)
5'	Wrap-Up	

Note: Exact times need to be adjusted based on the number of teams in the class. It is recommended to have 5 minutes for presentations + time for at least 1 question for every team presenting. You can also choose to implement this activity as a longer project where students can work on the design for a whole week etc.

Detailed instructions:

In case students did not create their own milk but still want to try the marketing team competition:

Milk creation can be substituted with an activity encouraging the students to review online the plant-based drinks market, thinking about ingredients used and their quality (organic ingredients, locally sourced ingredients, fortification, use of modern technologies like proteins produced by genetically modified organisms etc.). Encourage them to come up with their own idea for plant-based milk. Student teams can do the review in advance before the class or as part of the class (adjust the time accordingly).

Introduction

Inform the students that design of the product is just the first step to get the new product on the market. In this activity, they will try to finish their journey as a plant-based milk startup. In teams, they will select their best product, brainstorm its name, design and marketing strategy. By the end of the lecture, they will present their idea in short pitch to potential investors (their classmates).

Teamwork

Divide students in teams (if they already worked in teams in part A, let them just continue in the same ones). Distribute the Marketing Strategy Templates but encourage them to look for more tips online. Explain that by the end of the class they must have a presentation ready with information about their product, including the basic design of the package (encourage them to think about materials they will use - reusable glass, plastics, recycled materials etc.) and their basic marketing strategy. Presentations can have electronic format (using PowerPoint) or they can prepare paper-based posters.

Presentation and discussion

One by one, startup teams will present their pitches to "potential investors" represented by their classmates. Every presentation should last up to 5 minutes and be followed by brief discussion. Encourage students to ask questions and provide constructive feedback on the pitch (see additional resources for tips on how to review the pitch deck and provide constructive feedback).

Wrap-Up

By the end of the lecture, let the students share their feelings and ideas. What did they learn? What was the biggest surprise? What was the easiest task and what took them the most time? Have they encountered any unexpected obstacles? And how did they deal with them? Ask them about their teamwork experience, how they divided the tasks and what would they do differently.

Additional resources:

FRIDA Food Database

More info about plant based diets:

Plant-based diets and their impact on health, sustainability, and the environment: a review of the evidence: WHO European Office for the Prevention and Control of Noncommunicable Diseases

New WHO factsheet: how can we tell if plant-based products are healthy?

The Planetary Health Diet - EAT

Marketing pitches:

Marketing Strategy Template for Any Size Marketing Team - Optimizely

7 Steps to Create a Complete Marketing Strategy in 2022

How to create a marketing strategy and measure your results - FutureLearn

31 Simple Marketing Cheat Sheets For Business Owners That Don't Understand Marketing

15 Best Pitch Deck Examples from Successful Startups | Slidebean

Feedback and review:

How to review a pitch – Mentorphile

How to Give Constructive Feedback in the Workplace | Champlain College Online

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FoodUnfolded

Content adapted from the online course:

"Trust in Our Food: Understanding Food Supply Systems"

- University of Reading
- University of Turin
- EUFIC, The European Food Information Council

Content adapted from the online course:

"Revolutionising the Food Chain with Technology"

- Queen's University Belfast
- John Deere
- KU Leuven
- IMDEA Food Institute

Content adapted from

The Regenerative Agriculture Revolution

- CLC South
- CLC North West
- University of Hohenheim
- Neiker

Content adapted from "Food Career Guessing Game"

- CLC North West

A Day in The Life

- EIT Food RisingFoodStars
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About EIT Food

EIT Food is the world's largest and most dynamic food innovation community. We accelerate innovation to build a future-fit food system that produces healthy and sustainable food for all.

Supported by the European Institute of Innovation and Technology (EIT), a body of the European Union, we invest in projects, organisations and individuals that share our goals for a healthy and sustainable food system. We unlock innovation potential in businesses and universities and create and scale agrifood startups to bring new technologies and products to market. We equip entrepreneurs and professionals with the skills needed to transform the food system and put consumers at the heart of our work, helping build trust by reconnecting them to the origins of their food.

We are one of nine innovation communities established by the European Institute of Innovation and Technology (EIT), an independent EU body set up in 2008 to drive innovation and entrepreneurship across Europe.

Find out more at www.eitfood.eu or follow us via social media: Twitter, Facebook, LinkedIn, YouTube and Instagram.

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