Muinín Catayst STEAM Education for Sustainable Development and Futures Literacy

SDG15 Seeding Sustainability

Programme Phase 2: Experimentation and Exploration

Micro-Module 4: Growing and Foraging

SUBJECT AREAS: CSPE, English, Geography, Horticulture, Science

SDG15 Seeding Sustainability
Micro-Module 4: Growing and Foraging

Micro-Module (MM) 4: Growing and Foraging

Exploration and Experimentation

Subject Areas: Geography, Home Economics, Science

Micro-module Summary: Growing and Foraging

This micro-module is the first in the exploration and experimentation module that has been devised to build confidence and competence in learners in using the skills from module 1 on a local scale before developing their own project, event, system or service in the final implementation module.

The Growing and Foraging Micro-Module contains 12 lessons that invite learners to learn about seasonal growing, foraging and eating.

Learners will gain an awareness of what is grown (and can be foraged) in their local area, how eating seasonally has a more positive impact on the environment and ways in which communities can be more sustainable by growing their own food.

In this lesson, the learner will:

- gather information relating to individual consumption of local produce
- build knowledge and understanding of the varieties of fruit and vegetables grown / available locally at different times of the year.
- research local seasonal fruit and vegetables available in the local area at different times of the year
- work collaboratively in groups to conduct initial research and collate findings
- present initial findings to peers

Materials:

- Lesson Plans
- Learners' Resources

Lesson 1 Discovering Local
This lesson introduces learners to the benefits of growing local produce. It helps to boost local economy, contains the most nutrients when picked ripe and is typically cheaper when purchased directly from the local producer in season.

Resources Include: Flipped Classroom Worksheet: 100 miles of Local Produce and Local is Lush

Lesson 2 Have Your Pie and Eat It
We are becoming increasingly interested about the food we eat and where it comes from. We now can access more knowledge on our food than ever before, which has begun to impact our consumption decisions.

Resources Include: Flipped Classroom Worksheet: What I eat and where it comes from and Have your pie and eat it!

Lesson 3 Introduction Field to Fork and Tide to Table
Learners are introduced to the concepts of Field to Fork and Tide to Table through discussion and group research planning.

Resources Include: Introduction to Field to Fork and Tide to Table

Lesson 4 The ABC's of Grow It Yourself
Learners widen their knowledge of vegetables grown in Ireland, working in groups. They develop skills of research, collating and presenting information, as well as justifying opinions.

Resources Include: ABC's of Grow it Yourself (GIY) Ireland

Lesson 5 The Food Calendar
This lesson enables learners to become more familiar with local growing and foraging through the use of food calendars. There is opportunity for discussion and to engage in research as part of a group.

Resources Include: Eat Seasonably Flora in Fashion - Research, Lesson Materials: Food Calendar Discussion Cards

Lesson 6 Creating an Directory Addition: Vegetables
Learners will consider the range of vegetables grown in Ireland and practice organising, collating and sharing findings as part of a group. They will look in more detail at vegetables grown in Ireland, identifying Irish edible flora contributing further to their their awareness of sustainable food production and Ireland's food ecology.

Resources Include: Creating a Directory of Local Edible/Medicinal Flora (Lesson 4/Edible Medicinal Directory Addition - Vegetables, ABC's of Grow it Yourself (GIY) Ireland (Lesson 4)

Lesson 7 Directory Addition: Herbs
Learners practice organising, collating and sharing findings as part of a group. They will look in more detail at herbs grown in Ireland and also link to the lore of Herbs. This lesson adds to lesson 6 and Lesson 4 in the Edible-Medicinal Micro-module, and prepares learners for Lesson 8 / 10. It also encourages learners to think about what they may like to grow.

Resources Include: Worksheet: Directory Addition- Herbs; Investigating Herb Beds & Garden Design

Lesson 8 Raised Beds
In this lesson, learners consider design issues related to the construction and siting of raised beds. They also review language for making plans, elevation and scale.

Resources Include: Developing Raised Beds

Lesson 9 Crop Rotation
Learners will explore different aspects of growing vegetables using crop rotation, e.g. plant family, soil composition and nutrient cycles.

Support Sheet Includes: Activity responses

Lesson 10 Investigating Herb Beds and Garden Designs
This lesson encourages learners to apply design skills to planting and growing by creating a herb bed garden design.

Resources Include: Investigating Herb Beds & Garden Designs

Lesson 11 Composting
This lesson introduces learners to composting and recycling scraps from the garden and kitchen to enrich the soil, improving water retention, and protect against erosion.

Resources Include: Teachers' Guide: Composting

Lesson 12 Tree Planting
By planting trees, we contribute to the environment over long periods of time as they provide oxygen, improve the quality of air, improve climate, conserve water, preserve soil, and support wildlife. In this lesson, learners will be introduced to the life cycle of trees, the difference between bare root and potted trees, and review language related to trees

Resources Include: Tree Planting & Identification Images: tree-part identification, bare root and potted trees

External Expertise: Bianca Peel and James McCarthy
Adaptations / additions: Dr. Anita McKeown and Rebecca White

Using the Resources:

If you wish to use these resources, we can offer an induction and online support throughout the module to help you plan integration into your projects and timetable. To register for this option, please contact us e:hello@futurefocus21c.com For more information on the resources please visit www.muinincatalyst.com

Setting up an online learning environment for the lessons on this module:

Our lessons integrate the use of virtual learning environments. To ensure seamless use of our lessons, a module should be setup on your school's virtual learning environment such as Teams, Google Classroom, etc. Learners are encouraged to upload documents to share with their peers. If your virtual learning environment does not support document sharing, we recommend OneDrive or Google Drive.

You can also use Google Sites or Microsoft Sway to encourage learners to present their work over the year - this can easily be set up to reflect the aims of TY and provide a showcase for their work as well as assessment tool.

Setting up a Canva Education account:

As our lessons integrate design, our lessons also refer to Canva. Educators and schools are able to open a free Canva for Education account by registering here: https://www.canva.com/education/ Canva for Education provides primary and secondary school teachers and students with premium features and templates. You can then also set up lessons and invite your learners to the class.

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SDG 15 Seeding Sustainability
MM4 Growing and Foraging

MM4: Growing and Foraging

Experimentation and Exploration

Lesson 1: Discovering Local

Subjects: CSPE, English, Geography, Horticulture, Science

Lesson Title and Summary: Discovering Local

There are many benefits to growing local produce. It helps to boost local economy, contains the most nutrients when picked ripe and is typically cheaper when purchased directly from the local producer in season.

Learners will gain an awareness of what is grown and produced in their local area by engaging in research. They will work individually and collaboratively to source information, synthesise it and present their findings.

Vocabulary: Agricultural Production, Consumption, Food chain, Grower, Local, Produce(verb and noun), Seasonal

In this lesson, the learner will:

- gather information relating to individual consumption of local produce
- build knowledge and understanding of the varieties of fruit and vegetables grown / available locally at different times of the year
- research local seasonal fruit and vegetables available in the local area at different times of the year
- work collaboratively in groups to conduct initial research and collate findings
- present initial findings to peers

Materials

- Flipped Classroom Worksheet: 100 miles of Local Produce
- Worksheet: Local is Lush
- Wipe Board. Flip chart/ Paper, Markers
- Internet access
- Access to a shared working document for uploading and storing findings

ACTIVITY INSTRUCTIONS

Flipped Classroom Task - 100 miles of Local Produce

This is a flipped class in which the learners will work independently out of class.

Create a shared document template in which the learners can upload their findings. Give learners access to shared class documents to upload findings. Learners should upload their findings to the class shared document before the lesson. Give learners Flipped Classroom Worksheet: 100 miles of Local Produce to complete.

Activity 1: Discussion- discovering local (10 mins)

These discussion prompts consolidate what learners have discovered in the Flipped Classroom Task.

Activity 2: Guided Research (30 mins)

In their groups, learners will need access to the Internet, fruit and vegetable reference encyclopedias or books (optional). NOTE: Similar to their work in Flipped Classroom Task: 100 Miles of Local Produce, learners are tasked with finding out what various fruits and vegetables are available locally and seasonally within their county.

1. Instruct learners that they will receive a worksheet and they are to read through the whole worksheet carefully.
2. Distribute the Local is Lush Worksheet.
3. Ask learners to decide which tasks should be done/discussed as a whole group and which tasks can be divided among group members to be done individually.
4. Check their understanding of the terms local and seasonal and conduct a quick comprehension check if needed. Inform learners they have 20-25 mins to complete Tasks 1-2 on the worksheet.

Activity 3: Presenting Findings (10 mins)

Groups take it in turns to present their findings to the class (from Flipped Classroom Task & Local is Lush worksheet.).

- Listeners are to take notes and add to their findings any new information
- Learners then refer to notes in their reflection

NOTE: Presenting findings can be done as either,
- *Group peer-to-peer information share*
- *Whole class presenting*

REFLECTIVE EXERCISE: 3-2-1 (10 mins)

- Three things they feel they have learnt from the tasks
- Two things they found most interesting and would like to explore more
- One – their opinion they have about the tasks

Use Post-its or a mentimeter survey - www.mentimeter.com - to gather reflections

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EXTENSION / REDUCTION ACTIVITIES:

Reduction (40 min lesson): For a shorter lesson, specific fruit and vegetable types can be allocated or the number to find be limited and less time spent on information gathering, and presenting.

Extension (80 min lesson): For a longer lesson, more time can be allocated to collating the information and preparing to present as well as longer presentation time. Presentation of findings can be done as one group at a time to the whole class or group to group rotations.

MEDIA BOX: (materials, online video links, extra resources, case studies etc)

Grow It Yourself Directory https://giy.ie/veg-directory/

Seasonal Food Resources:
- https://www.soilassociation.org/
- https://stopfoodwaste.ie/resource/whats-in-season

Example Calendar: https://stopfoodwaste.ie/wp-content/uploads/2020/01/Print-Seasonal-Calendar-2020-2.pdf

People, Growers and Farmer Partnerships

- https://farmsafely.ie/a-new-way-of-farming-community-schemes-changing-rural-ireland/
- https://www.irishtimes.com/life-and-style/a-new-way-of-farming-community-schemes-changing-rural-ireland-1.2760464
- http://www.talamhbeo.ie/

Food Proclamation of Ireland http://www.leitrimorganic.com/wp-content/uploads/2014/02/Food-Sov-Ireland-Proclamation.pdf

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LOCAL TRIP / EXPERTISE / ADDITIONAL WORK AND ASSESSMENTS

Supermarket/Grocers/Butchers/Fishmongers/ Farm visits
Visit local growers and interview them on seasonal growing.

MM4 L1 WS: 100 MILES OF LOCAL PRODUCE FLIPPED CLASSROOM TASK

You are tasked with finding out what food is available locally within your area. Specifically what is within a 100 miles from your town/city and within the borders of your country.

It is recommended you find 1 - 2 items per category, e.g. fruit: strawberries and apples.

Step 1: Identify the 100 mile radius from your current location

What's your location?: _____

Find out and insert your 100 mile radius map below using
https://www.freemaptools.com/radius-around-point.htm#header

Insert map here

MM4 L1 WS: 100 MILES OF LOCAL PRODUCE FLIPPED CLASSROOM TASK

Step 2: Start your research

Categories:

Find out:
- What items are available locally (within the 100 mile radius) in each category?

- What companies offer "field/farm to fork"? Use these key words in your search: farm to fork strategy; sustainable food production; sustainable food processing and distribution; sustainable food consumption; food loss and waste prevention.

- What companies offer "tide to table"? Use these key words in your search: sustainable seafood production

- Where are they located exactly and where can they be delivered to?

- What products are produced/ grown/ offered in the local radius?

- What services do they offer?

Step 3: Upload your findings to the class shared document as directed by your teacher

MM4 L1 WS: LOCAL IS LUSH

Tip!: To manage time effectively, read the whole worksheet before starting the tasks.

Task 1: Vocabulary Key Terms

In groups, talk about the meaning of the following words and create your own definitions.

Local produce:

Seasonal produce:

Task 2: Initial Research (group work)

Working in groups:

1. Find out what fruit and vegetables are grown locally and what months they are available in your area (within your county or within 100 mile radius).
2. Combine your findings from the Flipped Classroom Task (100 Miles of Local Produce) and do an online search for further examples.

Your findings should include:

- List all the fruits and vegetables you can find locally grown and available.
- What month they are available in.
- Be specific in your list, including specific varieties (such as a yellow pear tomato or a sun gold cherry tomato).
- Where are they grown and who is/are the growers?

Task 3: Collating Findings & Task 4: Share your findings

Collate your findings and prepare them to be presented and shared with your classmates.

- Consider the best way to present the information that works both to be visually attractive and as a quick reference, e.g. consider a table or chart.
- Organise your combined findings for presentation so that each group member has an opportunity to speak.
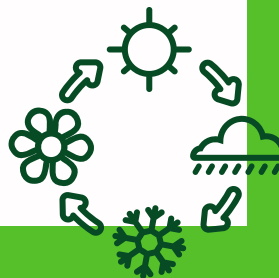
MONTH	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
FOOD						
VARIETY						
WHERE GROWN						
GROWN BY						

	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
FOOD						
VARIETY						
WHERE GROWN						
GROWN BY						

SDG 15 Seeding Sustainability
MM4 Growing and Foraging

MM4: Growing and Foraging

Experimentation and Exploration

Lesson 2: Have Your Pie and Eat It!

Subjects: CSPE, English, Geography, Horticulture, Science

Lesson Title and Summary: Have your pie and eat it!

We are becoming increasingly interested about the food we eat and where it comes from. We now can access more knowledge on our food than ever before, which has begun to impact our consumption decisions. Learners examine their own consumption habits, keep records, compare and contrast and display findings.

Vocabulary: Agricultural Production, Consumption, Food Chain, Grower, Local, Produce (verb and noun), Seasonal

In this lesson, the learner will:

- gather information relating their individual consumption - particularly relating to fruit and vegetables
- practice record keeping and gather data on their fruit and vegetable consumption for a specified period.
- calculate percentages of food consumed that was sourced locally / not locally
- compare percentages of local vs non local food consumed
- display findings in the form of a pie chart

Materials

- Internet access
- Flipped Classroom Worksheet: What I eat and where it comes from
- Worksheet: Have your pie and eat it!
- Calculating devices or methods.
- Board/projector or flip chart

ACTIVITY INSTRUCTIONS

Activity 1: Flipped Classroom Task: What I Eat and Where it Comes From

This task requires learners to record daily consumption for a duration as directed by the teacher. Minimum 1 day. Use FLIPPED CLASSROOM WORKSHEET: WHAT I EAT AND WHERE IT COMES FROM.

- Gathering data (Flipped Classroom Task)
  - For this task, learners will be required to note ALL THE FRUIT AND VEGETABLES they eat per day for a minimum of one day up to one week - duration at the discretion of the teacher. This includes foods that are part of a product like a yoghurt. Learners are advised to check the labels of items to find out ingredients.

Note: They may have to do some research to find out if the ingredients they list are produced in their country. Do not trust labelling saying "Local" on packaging as although something was made in the country the ingredients may have been sourced outside of the country.

Activity 2: Introducing Pie Charts (5 mins)

1. Direct learners to WORKSHEET: HAVE YOUR PIE AND EAT IT! to discuss possible commonalities of the two images.

Activity 3: Calculating Data (40 mins)

1. Divide learners into pairs to use WORKSHEET: HAVE YOUR PIE AND EAT IT! in which they will position the data they see in the example table into segments of the pie chart.
2. Advise learners that as there are 20 people surveyed there are therefore 20 parts of the pie chart. Guide learners in calculating the percentages, assisting where needed.
3. With guidance from the teacher, learners will survey their peers and create a pie chart.

Note: the pie chart should:
  - Show % of people who consumed food produced in their country
  - Show % people who consumed food produced elsewhere and imported - EU/Non EU
  - Show % of people who consumed food in which the location of production is unknown
  - Learners may be given the choice to use a computer to do this or manually on paper.
  - Assist learners where needed with calculations and transforming their data into their pie charts

Activity 4: Share findings (5 mins)

1. Hold a brief whole class discussion inviting learners to share their findings. Ask:
  - How did the findings compare?
  - What was surprising to you?

REFLECTIVE EXERCISE: 3-2-1 (10 mins)

- Three things they feel they have learnt from the tasks
- Two things they found most interesting and would like to explore more
- One – their opinion they have about the tasks

Use Post-its or a mentimeter survey - www.mentimeter.com - to gather reflections

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EXTENSION / REDUCTION ACTIVITIES:

Reduction (40 min lesson): For a shorter lesson, reduce the time given for calculations and pie chart creation. These could be undertaken at home for the next class

Extension (80 min lesson): For a longer lesson, extend pie chart creation to show data from the flipped lesson findings. Use some of the resources in the media box e.g. incorporate tutorials

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MEDIA BOX: (materials, online video links, extra resources, case studies etc)

Pie Chart Generators

- https://www.canva.com/graphs/pie-charts/
- https://nces.ed.gov/nceskids/graphing/classic/pie.asp
- https://www.meta-chart.com/pie
- https://www.rapidtables.com/tools/pie-chart.html

Tutorials: https://kids.classroomsecrets.co.uk/resource/read-and-interpret-pie-charts-video-tutorial/
https://kids.classroomsecrets.co.uk/resource/pie-charts-with-percentages-video-tutorial/

LOCAL TRIP / EXPERTISE / ADDITIONAL WORK AND ASSESSMENTS

- Visit local supermarkets to complete the Flipped Classroom task.
- Invite a supermarket manager or stockist to discuss how they select produce for their stores.
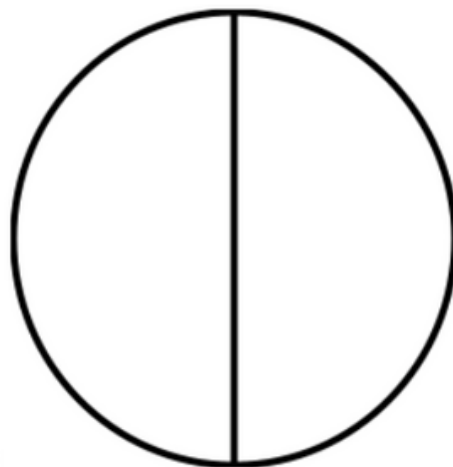
What do the following images have in common?

Imagine you have conducted a survey to find out the most preferred type of pizza.

Example Favourite Pizza for 20 people				
Cheese	Ham and Pineapple	Meat feast	Vegetarian	Vegan
4	5	6	1	4

Looking at the numbers, how could you fit these numbers into a circle (pie)?
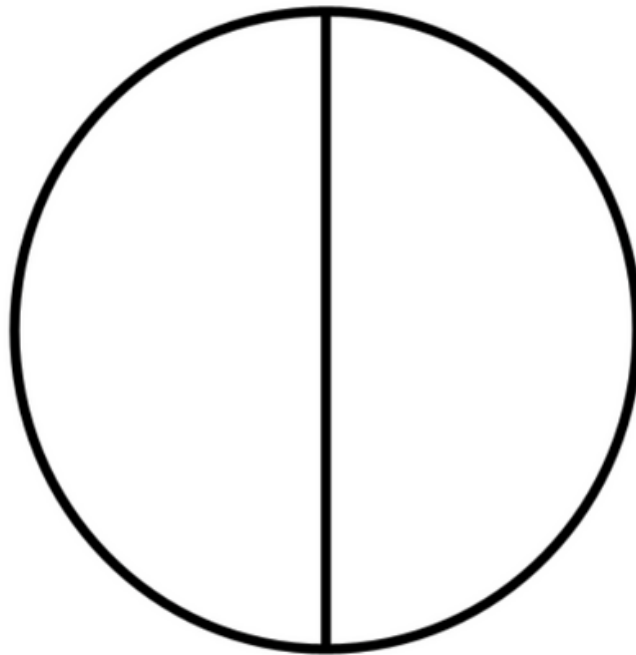

Eg:

20 people =100% 10 people = 50 %

MM4 L2 WS: HAVE YOUR PIE AND EAT IT!

Pair work:

Using the data from the table, complete this pie chart showing how many people prefer which type of pizza:

If 20 people = 100% and 10 people = 50% Calculate What percentage are the following number of people:

1 person =	11 people =
2 people =	12 people =
3 people =	13 people =
4 people =	14 people =
5 people =	15 people =
6 people =	16 people =
7 people =	17 people =
8 people =	18 people =
9 people =	19 people =

MM4 L2 WS: HAVE YOUR PIE AND EAT IT!

Survey your peers and find out:

How many people consumed food produced in their country?
How many people consumed food produced elsewhere/imported from abroad?
How many people consumed food but didn't know where it was from?

Produced in country	Produced abroad	Unknown

MM4 L2 WS: HAVE YOUR PIE AND EAT IT!

Now working in pairs, show this data in a pie chart:

- Show % of people who consumed food produced in their country
- Show % people who consumed food produced elsewhere and imported - EU/Non EU
- Show % of people who consumed food in which the location of production is unknown
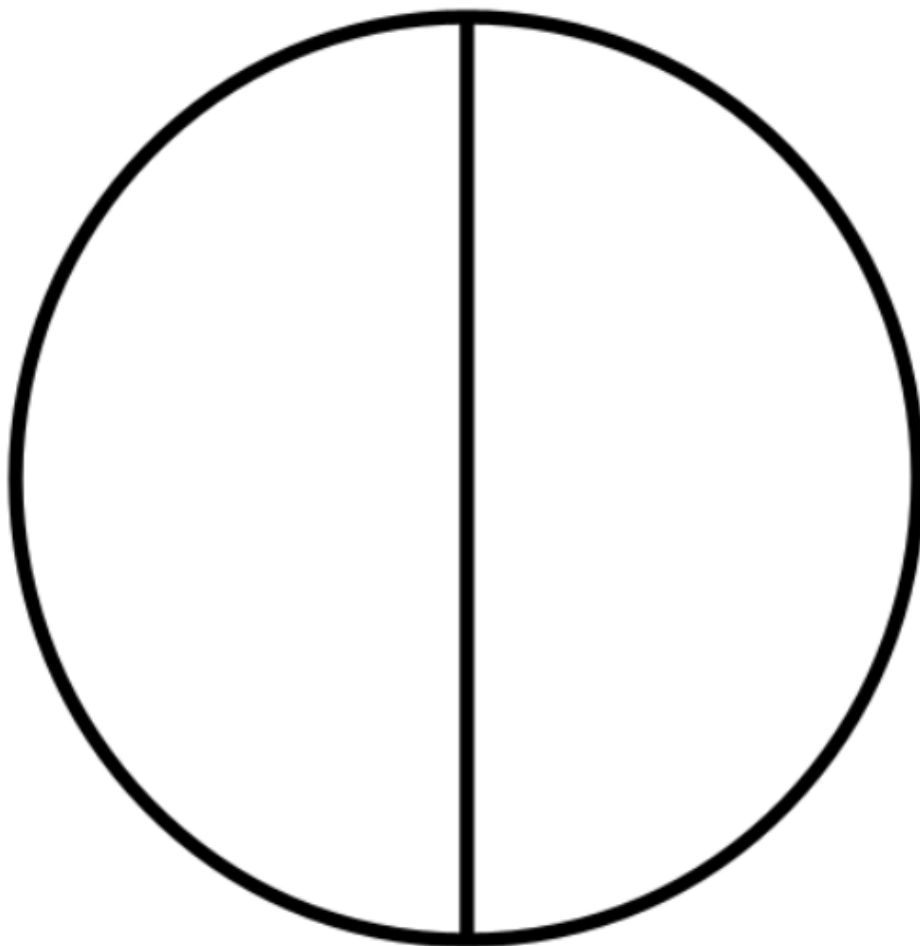
MM4 L2 WS: 'WHAT I EAT AND WHERE IT COMES FROM' FLIPPED CLASSROOM TASK

Gathering Data

For this task you will be required to note all the fruit and vegetables that you eat. This includes foods that are part of a product, like a yoghurt. Check the labels of items to find out ingredients.

You will do this for: _____ (insert duration here as directed by your teacher)

Note: You may have to do some research to find out if the ingredients you list are produced in your country. Do not trust labeling saying "Local" on packaging as although something was made in the country the ingredients may have been sourced outside of the country.

	FOOD	INGREDIENTS	LOCAL)Grown/produced in...be specific)	NON LOCAL(indicate where its from)	UNKNOWN
EXAMPLE	Homemade Strawberry Jam from	Fresh Strawberries Water Sugar Lemon	Kerry:_____ farm	Non EU- ... EU -	
Item 1					
2					
3					
4					
5					
6					
7					

MM4: Growing and Foraging

Experimentation and Exploration

Lesson 3: Field to Fork and Tide to Table

Subjects: CSPE, English, Geography, Horticulture, Science

Lesson Title and Summary: Field to Fork and Tide to Table

Making food production more resilient and eco-friendly ensures communities are more sustainable
Learners are introduced to the concepts of Field to Fork and Tide to Table through discussion and group research planning.

Vocabulary: Agricultural Production, Consumption, Food Chain, Grower, Local, Produce (verb and noun), Seasonal

In this lesson, the learner will:

- brainstorm field/farm to fork and tide to table concepts
- be introduced to the concept of Sustainable (sea)food production, processing and distribution, food consumption, loss and waste prevention

Materials

- Worksheet: Introduction to Field to Fork and Tide to Table

ACTIVITY INSTRUCTIONS

Activity 1: 5 Things Game (5 mins)

This game can be played as a whole class or in small groups. Name 5 things that:

- We consume that originates from a farm (meat, eggs, milk, fruit, vegetables).
- We consume that originates from the ocean/seas (fish, shellfish, seaweed, salt, caviar, sea vegetable).
- We drink that contain animal products (milk, alcohol, pink lemonade & grapefruit juices containing carmine, Orange Juice containing Omega 3).
- We drink that comes from plants (milk, tea, coffee, natural fruit or vegetable juices).

Activity 2: Introduction to Field to Fork and Tide to Table (20 mins)

1. Divide learners into groups of 3-4.
2. Instruct learners to view the WORKSHEET: INTRODUCTION TO FIELD TO FORK AND TIDE TO TABLE.
3. Advise learners to organise themselves to hold a brainstorming discussion using questions on the worksheet and to take notes to be used later.
4. Set learners to task advising of a time limit to complete tasks.

Note: You may wish to suggest they nominate a group leader, scribe and time keeper. Also this is a brainstorming session so it is advisable to tell learners not to look up any terms or questions online.

Activity 3: Regroup and share (10 mins)

1. Regroup learners so that there a representatives from each of the groups in Activity 2.
2. Share ideas from the discussion and add to notes.

Activity 4: Making a research plan (10 mins)

1. Ask learners to return to their original groups.
2. Direct learners to revisit the original questions and decide how they might find the information necessary to answer these questions.
3. Instruct groups to make a research plan for finding answers to these questions using the Internet, library sources and community sources.
4. Set the research plans to be completed for homework, or for a follow on lesson.

REFLECTIVE EXERCISE: 3-2-1 (10 mins)

- Three things they feel they have learnt from the tasks
- Two things they found most interesting and would like to explore more
- One – their opinion they have about the tasks

Use Post-its or a mentimeter survey - www.mentimeter.com - to gather reflections

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EXTENSION / REDUCTION ACTIVITIES:

Reduction (40 min lesson): For a shorter lesson, remove activity 3 and set for homework.

Extension (80 min lesson): For a longer lesson, spend more time on the research plan to be actioned for homework, sharing the links in the media box.

Option B: Foodspan - Watch Food Frontiers (36 mins) using the discussion guide to consider the food citizenship in a number of projects https://www.foodspan.org/lesson-plans/films/food-frontiers.html

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MEDIA BOX: (materials, online video links, extra resources, case studies etc)

Food policy:

Why do we need a Farm to Fork strategy' (1:00 min) EU policy https://youtu.be/1tXseroYYFs

Farm to Fork and Zero Emissions: https://www.eitfood.eu/blog/post/what-is-the-role-of-the-farm-to-fork-strategy-in-achieving-zero-emissions

- https://www.euronews.com/green/green-series/farm-to-fork
- https://www.coleparmer.co.uk/tech-article/the-food-safety-journey-farm-to-fork
- https://emersonclimateconversations.com/2016/09/01/food-safety-remains-a-top-priority-for-retail-businesses/
- https://www.foodnavigator.com/Article/2020/05/22/What-does-the-farm-to-fork-strategy-mean-for-the-future-of-food-in-Europe

Additional Resources

John Hopkins University Foodspan programme https://www.foodspan.org/
14 - 16 years: https://www.foodafactoflife.org.uk/14-16-years/

History of Farm to Table https://upserve.com/restaurant-insider/history-farm-table-movement

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LOCAL TRIP / EXPERTISE / ADDITIONAL WORK AND ASSESSMENTS

Arrange local visits to farms/fishmongers/butchers/grocers/food factories.

MM4 L3 WS: FIELD TO FORK & TIDE TO TABLE

Discussion:

Discuss what you think these key terms mean.
Write down the main ideas.

- What do you think is meant by "food safety"?
- Why might this be important?
- What do you think is meant by "Field(Farm) to Fork"?
- What do you think is meant by "Tide to Table"?
- What stages do you think might be involved in the production of food products?
- How might the Field to Fork process/production look?
- How might the Tide to Table process/production look?
- What do you think is involved?
- Who do you think is involved?

Field/Farm to Fork and Tide to Table Notes:

SDG 15 Seeding Sustainability MM4 Growing and Foraging

MM4: Growing and Foraging

Experimentation and Exploration

Lesson 4: ABC's of Grow it Yourself (GIY) Ireland

Subjects: CSPE, English, Geography, Horticulture, Science

Lesson Title and Summary: ABC's of Grow It Yourself (GIY) Ireland

By growing our own food, we support living healthier and more sustainable lives. What we eat matters and how it is grown and produced matters even more. Globally, more than 690 million people remain undernourished, while diet is the leading cause of mortality in the developed world.

Learners widen their knowledge of vegetables grown in Ireland. They develop skills of research, collating and presenting information, as well as justifying opinions.

Vocabulary: Annual, Biota, Crop, Fertile, Flora, Fauna, Growing, Harvesting, Limitations, Perennial, Side-shoots, Soil, Sowing, Tips, Vegetables, Weed

In this lesson, the learner will:

- develop recording, analysis and evaluation skills
- explore and discover the meaning of biota, flora and fauna
- investigate and observe the patterns of colour (flora)
- investigate and observe the attraction of colour to fauna
- commence the creation of a directory of local edible flora
- reconnect with food, nature and community
- explore the local environment, connections between the colour of flora to fauna
- identify local edible flora and how they are used in food preparation
- reconnect with food, nature and community

Materials

- Worksheet: ABC's of Grow it Yourself (GIY) Ireland
- Internet Access

2 ZERO HUNGER

3 GOOD HEALTH AND WELL-BEING

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

13 CLIMATE ACTION

ACTIVITY INSTRUCTIONS

Activity 1: ABC's of Grow It Yourself (GIY) Ireland (35 mins)

1. Direct learners to the ABC's of Grow It Yourself (GIY) IRELAND WORKSHEET. Go through the instructions and check understanding.
2. Allocate learners 3x letters from the alphabet.
3. Give learners 20-25 mins to complete Steps 1 - 3 of the worksheet:

Worksheet instructions:

Go to GIY Vegetable Directory website and to choose one vegetable for each of their allocated letters to investigate.

Example: You have been allocated the letters A, C and L. You look through the directory and choose: Artichoke, Carrots and Kale

Inform learners that while investigating they must consider open questions to help them with their research:

Examples of open questions:

- *What is the common name of the vegetable?*
- *What is the botanical name?*
- *Why is this vegetable worth growing?*

Activity 2: Share findings (15 mins)

1. Invite learners to share findings with peers in the form of whole class discussion or in small groups. Learners could rotate groups in order to share their findings with the whole class.

REFLECTIVE EXERCISE: 3-2-1 (10 mins)

- Three things they feel they have learnt from the tasks
- Two things they found most interesting and would like to explore more
- One – their opinion they have about the tasks

Use Post-its or a mentimeter survey - www.mentimeter.com - to gather reflections

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EXTENSION / REDUCTION ACTIVITIES:

Reduction (40 min lesson): For a shorter lesson, reduce the number of vegetables to research in Steps 1 - 3 of the worksheet and remove Step 4.

Extension (80 min lesson): For a longer lesson, spend more time on Step 4. Share findings with peers.

Additional lessons: Using the Grow Cook Eat series, a lesson could be given to a number of vegetables - watching the video and then discussing issues necessary with regard to planting.

See also lessons 8 - 12 of this micro-module for designing and developing a school garden.

MEDIA BOX: (materials, online video links, extra resources, case studies etc)

Grow it yourself Veg Directory https://giy.ie/get-growing/veg-directory/

Chelsea Physic Garden plant explorer - good source for species and botanical names https://cpg.gardenexplorer.org/

Grow Cook Eat - series of short videos sponsored by Bord Bia and the EPA's Stop Food Waste featured on RTE 1, 2018. Each video features a star vegetable, grown from seed to harvest and used to create a delicious meal that anyone at home can replicate

- Potatoes part 1 (12:03 min) https://youtu.be/PtAOLkg4Trc
- Potatoes part 2 (11.53 min) https://www.youtube.com/watch?v=rq1boU7wwco
- Tomatoes part 1 (11.35 min) https://www.youtube.com/watch?v=p_DMQn2RURw
- Tomatoes part 2 (12.52 min) https://www.youtube.com/watch?v=VD30Za6Noac

You can find all the shows seasons (1 -3) https://giy.ie/series/grow-cook-eat/ Season 1 can be found at the bottom of the webpage

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LOCAL TRIP / EXPERTISE / ADDITIONAL WORK AND ASSESSMENTS

Visit local allotments and / or gardeners.

Conduct a mapping exercise in your local area for community gardens, vegetable gardens and local growers. This can be used to exchange or get seeds from varieties that are already growing locally.

Step 1: You will be allocated letters from the alphabet

- Go to the **GIY Vegetable Directory** website and choose one vegetable for each of your allocated letters to investigate.
  Example: You have been allocated the letters A, C and L. You look through the directory and choose: Artichoke, Carrots and Kale.

Step 2: Create open-ended questions to prepare for your investigation into your chosen vegetables
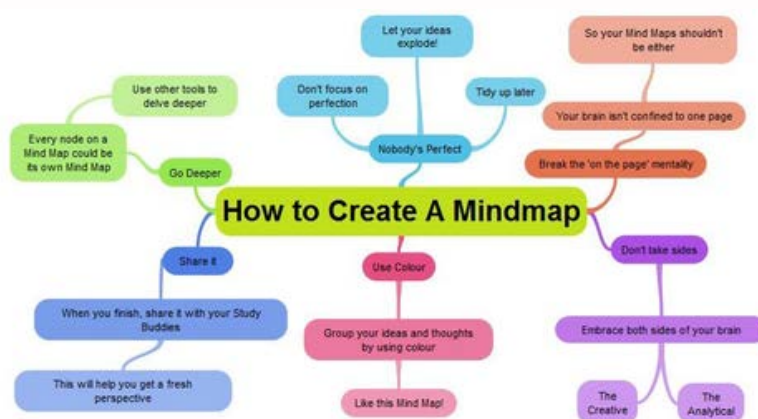

Examples of an open question:
Why is this vegetable worth growing?
Will this vegetable grow well locally?

Step 3: Gather information under the headings below

- You must summarise and use your own words. You may record your information in mind map or table like the ones below:

Sowing	Growing	Harvesting	Problems	Tips

Step 4: Share findings with your peers in class

Step 5: As a class, create a new section to the class directory of DIRECTORY OF LOCAL EDIBLE / MEDICINAL FLORA.

MM4: Growing and Foraging

Experimentation and Exploration

Lesson 5: The Food Calendar

Subjects: CSPE, English, Geography, Horticulture, Science

Lesson Title and Summary: The Food Calendar

Buying produce in season means that there is no need for long-term storage or artificial growth. Buying locally produced food supports local businesses.

This lesson enables learners to become more familiar with local growing and foraging through the use of food calendars. There is opportunity for discussion and to engage in research as part of a group.

Vocabulary: Food Calendar, Local, Seasonal

In this lesson, the learner will:

- explore the usefulness of calendars
- identify the concept of and need for a seasonal food calendar
- research available foods in their local area
- collate findings
- combine findings to produce an open source (working) food calendar which can be updated

Materials

- Calendars (students' own)
- Internet Access
- Lesson Materials: Food Calendar Discussion Cards - one set per group (cut up)
- Worksheet: Eat Seasonably Flora in Fashion - Research

ACTIVITY INSTRUCTIONS

This lesson is best conducted over a number of lessons to ensure learners have adequate time for discussion and research. Allow a minimum of 2 hours if including the upload of the research.

Pre-class activity(optional)
Request that learners bring a copy of a calendar used within their household.

Activity 1: Whole Class Lead in (5 mins)

1. As a whole class, briefly engage learners with some lead in questioning. Ask them to think about and share ideas:
- What is a calendar?
- What is it used for?
- Why is it useful?

Activity 2: Discussion Cards (15 mins)

1. Divide learners into groups of 3 - 4.
2. Instruct learners that they are to brainstorm and discuss ideas on the theme of a food calendar using THE FOOD CALENDAR DISCUSSION CARDS (one set of cards per group).
3. Instruct learners to have a brief chat prompted by card questions.

Activity 3: Engaging in Research (60 mins)

Ask learners to refer to LOCAL IS LUSH WORKSHEET (LESSON 1) in which they compiled a list of fruit and vegetables grown locally.

1. Invite learners to pick the name of a month of the year from a "hat" or other container. Depending on the number of groups some groups may choose more than one month. E.g., If you have 30 learners in 5 groups of 3, then give each group two months of the year and the teacher takes the remaining two to offer as an example.
2. Inform learners that they will discuss and plan what fruit and veg to research for their chosen months.
3. Direct learners to WORKSHEET: EAT SEASONABLY FLORA IN FASHION- RESEARCH.
4. Go through the instructions. Check for understanding. Clarify where needed.
5. Learners engage in discussion and planning and commence research using the questions on the work.

Activity 4: Uploading Research (15 - 30 mins)
1. When it is time, the groups will be directed to upload their contribution to the class 'Food Calendar' and share their findings with the other groups.

REFLECTIVE EXERCISE: 3-2-1 (10 mins)

- Three things they feel they have learnt from the tasks
- Two things they found most interesting and would like to explore more
- One – their opinion they have about the tasks

Use Post-its or a mentimeter survey - www.mentimeter.com - to gather reflections

EXTENSION / REDUCTION ACTIVITIES:

Reduction: For a shorter lesson, omit the "optional whole class lead in" and reduce the time spent on discussion cards and concentrate on Activity 3.

Extension: For a longer lesson, spend more time on the research gathering information in groups. Activity 4 - The research can also be uploaded to the class Food Calendar, or depending on time completed at home or within another class.

Option B: Direct learners to consider some of the links in the media box - including seasonal resources and sample calendars, particularly discussing the design aspects of the calendars.

MEDIA BOX: (materials, online video links, extra resources, case studies etc)

Grow it yourself, Ireland Directory https://giy.ie/veg-directory/

Example Seasonal Calendars

- https://stopfoodwaste.ie/wp-content/uploads/2020/01/Print-Seasonal-Calendar-2020-2.pdf
- https://stopfoodwaste.ie/wp-content/uploads/2018/11/Final-Seasonal-Calendar.pdf
- https://www.waresofknutsford.co.uk/free-downloadable-british-produce-seasonal-calendar/
- https://alisonbick.co.uk/portfolio/seasonal-food-calendar-cornish-food-box/
- https://imgur.com/gallery/5wtBR

Seasonal Food Resource: Stop Food Waste https://stopfoodwaste.ie/resource/whats-in-season
- Slow Food Ireland https://slowfoodireland.com/seasonal/
- Bord Bia https://www.bordbia.ie/whats-in-season/

LOCAL TRIP / EXPERTISE / ADDITIONAL WORK AND ASSESSMENTS

Visit local growers and ask them what they are growing and when they plant / harvest.
Supermarket and grocery visits - ask to speak with their buyer about seasonal produce.
Interview growers and farmers - see supporting skills SDG 8 Micro-module 4 - Podcasts / Interviews
Invite a local designer or printer to talk to the class about designing visual material.

15 LIFE ON LAND

What is a food calendar?

What information might you find on a food calendar?

Why would we need/ want a food calendar?

Who might find a food calendar useful?

Why is it good to know what's in season?

How might buying and eating local seasonal foods impact our world?

What is a food calendar?

What information might you find on a food calendar?

Why would we need/ want a food calendar?

Who might find a food calendar useful?

Why is it good to know what's in season?

How might buying and eating local seasonal foods impact our world?

MM4 L5 WS: EAT SEASONABLY FLORA IN FASHION

You are tasked with finding out what is grown and when. To discover what's in season, let's walk the Flora Catwalk!

In your groups you are going to create a section of a FOOD CALENDAR.

Each group will research food in one month of the year. If you completed the Local is Lush Worksheet, (Lesson 1 from the 'Growing and Foraging' micro-module) then you may use the information you gathered there.

Task 1: Discussion & Planning

You are to find out:

- What month you need to search.
- Where you will find a pictorial reference or a photograph of each item you include.
- How you can best organise your findings? How will you display your findings so that they are informative and visually appealing?
- How your group will share notes - consider a digital document that is easily edited, updated and shared.
- What fruit and vegetables are grown locally in the month(s) you are assigned. Find at least 2 fruit types and 2 vegetable types.

Task 2: Gathering information

1. Decide what 2 fruits and 2 vegetables your group will research.
2. Set to researching and gathering information.
3. Collate findings as a whole group.

In your research consider the following and discuss with your group. Perhaps consider dividing tasks between you.

- What is the common name and the scientific name of the fruit or vegetable you are researching?
- What is the name of said fruit or vegetable in another language (e.g., Irish, French or Chinese)?
- Where is it grown?
- What information can you find on:
  - Planting?
  - Growing?
  - Harvesting?
- What varieties are there and what varieties are recommended?
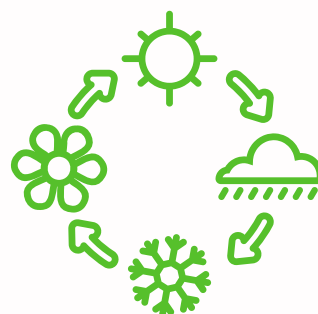
SDG 15 Seeding Sustainability
MM4 Growing and Foraging

MM4: Growing and Foraging

Experimentation and Exploration

Lesson 6: Creating A Directory Addition - Vegetables

Subjects: CSPE, English, Geography, Horticulture, Science

Lesson Title and Summary: Creating A Directory Addition- Vegetables

A wide range of vegetables are grown in Ireland, the most popular being cabbage, carrots, broccoli, swedes, cauliflower and parsnips.

Learners will consider the range of vegetables grown in Ireland and practice organising, collating and sharing findings as part of a group. They will look in more detail at vegetables grown in Ireland, identifying Irish edible flora contributing further to their their awareness of sustainable food production and Ireland's food ecology.

Vocabulary: Annual, Collation, Data Gathering, Data Analysis, Growing, Limitations, Perennial, Sowing, Vegetables

In this lesson, the learner will:

- develop recording, analysis and evaluation skills
- continue their creation of a directory of foods grown in Ireland
- reconnect with food, nature and community
- identify Irish edible flora, their growing and how they are used in food preparation

Materials

- Worksheet: Directory Addition - Vegetables
- Worksheet: Creating a Directory of Local Edible/Medicinal Flora (Lesson 4/Edible Medicinal mciro-module)
- Worksheet: ABC's of Grow it Yourself (GIY) Ireland (Lesson 4)
- Internet Access

ACTIVITY INSTRUCTIONS

This is a follow on lesson from Lesson 4 of the Edible Medicinal micro-module. As a class, learners will create a new section to the class directory of Irish edibles focussing on vegetables).

Activity 1: Organising Previous Findings (10 mins)

1. Ask learners to form small groups (max 4 people).
2. Give learners time to read through their previous findings on Lesson 4 WORKSHEET: ABC'S OF GROW IT YOURSELF (GIY) IRELAND.

Activity 2: Collating findings (30 mins)

1. Using WORKSHEET: DIRECTORY ADDITION - VEGETABLES, groups can collate and present their ideas.
2. All findings should be recorded, paraphrased and summarised in their own words.
3. This activity is best done on a computer or tablet where groups can create digital collations using mind maps, tables or a presentation format of their choice.

Activity 3: Uploading and sharing ideas to class directory (10 mins)

1. Working on class computers or tablets, begin to upload collated findings to DIRECTORY OF LOCAL EDIBLE/MEDICINAL FLORA in the new section - VEGETABLES.

REFLECTIVE EXERCISE: 3-2-1 (10 mins)
- Three things they feel they have learnt from the tasks
- Two things they found most interesting and would like to explore more
- One – their opinion they have about the tasks

Use Post-its or a mentimeter survey - www.mentimeter.com - to gather reflections

EXTENSION / REDUCTION ACTIVITIES:
Reduction: For a shorter lesson, undertake activities 1 and 2 only reducing the time for activity 2 to 20 mins, to be continued in a second class or at home.

Extension: For a longer lesson, consider conducting a peer review session of group work and include uploading the final data they have gathered to the directory.

Option B / Additional lesson: Consider the 'Information is Beautiful examples' from the media box and as a class discuss how they might like to present their data. This also links into Lesson 5 and their seasonal Calendar.

MEDIA BOX: (materials, online video links, extra resources, case studies etc)

Grow it Yourself, Ireland Veg Directory https://giy.ie/get-growing/veg-directory/

Use Change X to find national and local community food projects and other initiatives https://www.changex.org/ie/

Information is beautiful - Information is Beautiful is dedicated to making sense of the world with graphics & data-visuals.

- https://informationisbeautiful.net/visualizations/global-food-supply-where-does-all-the-worlds-food-go/
- https://informationisbeautiful.net/visualizations/food-waste/
- https://informationisbeautiful.net/visualizations/how-kelp-seaweed-can-save-the-world/
- https://informationisbeautiful.net/visualizations/which-fish-best-safest-healthy-to-eat/

Presenting Data:

- Data Visualisation for Students https://www.canva.com/learn/data-visualisation-for-students/
- Free online Mind mapping tool https://www.mindmup.com/
- Telling a story with Data https://www.skillsyouneed.com/present/presenting-data.html

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LOCAL TRIP / EXPERTISE / ADDITIONAL WORK AND ASSESSMENTS

Conduct a mapping exercise to determine how many food gardens there are in the local area.

Visit local allotments and gardens to see what vegetables are grown locally. Ask growers

- what problems they have, e.g. wind, poor soil, pests
  - what is the biggest growing problem in this area
  - do they know what type of soil they have and if they have to do much to it
- what tips they have for growing vegetables
- do they use compost or make their own
- what do they grow
  - what does their planting year look like
  - when do they harvest what

Contact your local Tidy Towns group to see what work they are doing on local food sustainability, e.g. growing projects, or waste initiatives, e.g. composting.

MM4 L6 WS: DIRECTORY ADDITION: VEGETABLES

You are going to work in a group to collate your findings about vegetables.

You will need your WORKSHEET: ABC'S OF GROW IT YOURSELF (GIY) IRELAND from Lesson 4.

Task: In your group, collaborate to collate and combine the information you gathered in the worksheet.

- **The following information should be included:**

1. Common name
2. Botanical name
3. Pictorial references of the vegetables you researched
4. Information relating to the vegetable you find interesting

- **Think about how you want to present your information.**

  - Do you want to make a mind map
  - A table
  - Or another format?

-
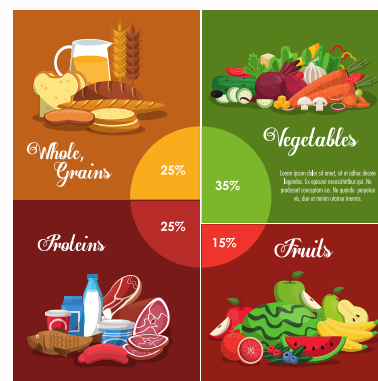
Sowing	Growing	Harvesting	Problems	Tips

- Upload your final layouts to the DIRECTORY OF LOCAL EDIBLE/MEDICINAL FLORA in the new section - VEGETABLES.

MM4: Growing and Foraging

Experimentation and Exploration

Lesson 7: Directory Addition - Herbs

Subjects: CSPE, English, Geography, Horticulture, Science

Lesson Title and Summary: Directory Addition - Herbs

Herbs are a widely used group of plants, with savory or aromatic properties used to flavour, garnish, for medicinal purposes, or for fragrances.

Learners practice organising, collating and sharing findings as part of a group. They will look in more detail at herbs grown in Ireland and also link to the lore of Herbs. This lesson adds to lesson 6, in the Growing and Foraging Micro-module and Lesson 4 in the Edible-Medicinal Micro-module.

This lesson also prepares learners for Lesson 8 / 10 and to think about what they may like to grow.

Vocabulary: Annual, Edible Weeds, Growing, Harvesting, Herbs, Perennial, Tips,

In this lesson, the learner will:

- develop design-thinking skills
- collaborate and communicate
- reconnect with food, nature and community
- develop foundational knowledge for herb garden planning
- research and practice garden designing
- sketching and scale drawings

Materials

- Worksheet: Directory Addition- Herbs
- Linked Worksheet: Investigating Herb Beds & Garden Design
- Internet/ Computer access

ACTIVITY INSTRUCTIONS

This is a follow on from Lesson 4 in the Edible Medicinal module and Lesson 6 of the Growing & Foraging module. As a class, learners will create a new section to the class directory of Irish edibles (on herbs). This work will also link into Lesson 10 of the Growing and Foraging micro-module

Activity 1: Organising Previous Findings (10 mins)
- Ask learners to form small groups (max 4 people).
- Give learners time to read through their previous findings on WORKSHEET: CREATING A DIRECTORY OF LOCAL EDIBLE FLORA.

Activity 2: Collating findings (30 mins)
- Using WORKSHEET: DIRECTORY ADDITION- HERBS, groups can collate and present their ideas.
- All findings should be recorded, paraphrased and summarized in their own words.
- This activity is best done on a computer or tablet where groups can create digital collations using mind maps, tables or a presentation format of their choice.

Activity 3: Uploading and sharing ideas to class directory (10 mins)
- Working on class computers or tablets, upload collated findings to DIRECTORY OF LOCAL EDIBLE/MEDICINAL FLORA in the new section - HERBS, Complete at home / in an additional class.

REFLECTIVE EXERCISE: 3-2-1 (10 mins)
- Three things they feel they have learnt from the tasks
- Two things they found most interesting and would like to explore more
- One – their opinion they have about the tasks

Use Post-its or a mentimeter survey - www.mentimeter.com - to gather reflections

EXTENSION / REDUCTION ACTIVITIES:

Reduction (40 min lesson): For a shorter lesson, undertake activity 3 as an additional class - set up a peer review/information session to discuss the additions and prepare information upload.

Extension (80 min lesson): For a longer lesson, extend Activity 3 and have a whole class peer review of findings and information including layout before uploading to the directory.

Option B: Learners can also begin to consider ideas for a herb garden or herb bed - see media box for videos and videos / articles on planning / growing - this will link into Lesson 10.

MEDIA BOX: (materials, online video links, extra resources, case studies etc)

Video: '15 Must Have Herbs for the Kitchen - Easy Grow Outdoors' welsh context (20:42min)
https://www.youtube.com/watch?v=1EpY1PElF6g

Video: '6 Low-Maintenance Perennial Herbs For A Beginner Garden' -
https://www.youtube.com/watch?v=ETNHW2nx9RQ

Herb Garden planning: https://www.thespruce.com/planning-a-herb-garden-1402617

Blog: CountryLife - Irish context 'Grow your own herbs' https://blog.countrylife.ie/gardening/grow-your-own/growing-your-own-herbs/

Article: 'How to grow herbs - easy gardening tips for beginners' https://naturallivingfamily.com/how-grow-herbs/

Blog: 'Back to the roots - How to grow herbs' https://blog.backtotheroots.com/2020/12/02/how-to-grow-herbs/

Change X - proven ideas and funding for community www.change.org

Grow it Yourself - veg directory https://giy.ie/veg-directory/

Grow it Yourself HQ https://giy.ie/grow-hq-things-to-do/

Irish Food Directory https://www.foodirelanddirectory.com/online-directory/

LOCAL TRIP / EXPERTISE / ADDITIONAL WORK AND ASSESSMENTS

Use Change X (see media box) to identify local food growing projects to visit and consider what is being grown, how it is laid out and ask the growers / owners for tips that are relevant to your location, e.g. local weather, prevailing wind, soil quality and composition.

Use The Irish Food Directory (see media box) to find Irish food producers and contact them to see if they source their herbs locally.

If possible arrange a visit to Grow it Yourself HQ, Waterford (see media box).

Use Grow it Yourself (see media box) to see what others are growing and link into the learners own findings and food directory.

MM4 L7 WS: DIRECTORY ADDITION - HERBS

Form groups of 4 - this can be the same group that researched the vegetables in Lesson 6 or a new group.

Task: In your group, collaborate to collate and combine the information you gathered in the worksheet.

- The following information should be included:

  - Common name
  - Botanical name
  - Pictorial references of the herbs you researched
  - Related Information, e.g. herb lore, local lore about herbs or any other information about the herb you find interesting

- Think about how you want to present your information. Do you want to make:

  - a mind map?
  - A table?
  - Or another format?
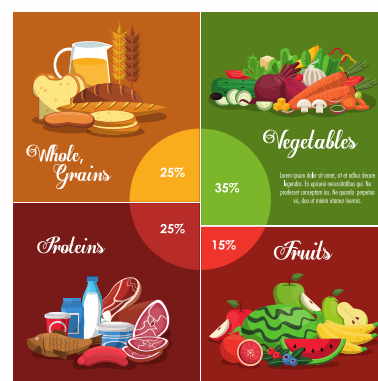
Sowing	Growing	Harvesting	Problems	Tips

- Upload your final layouts to the DIRECTORY OF LOCAL EDIBLE/MEDICINAL FLORA in the new section - HERBS.

MM4: Growing and Foraging

Experimentation and Exploration

Lesson 8: Raised Beds

Subjects: CSPE, English, Geography, Horticulture, Science

Lesson Title and Summary: Raised Beds

Raised-bed gardening is a form of gardening in which the soil is contained in 'beds', which are usually made of wood, rock, or concrete and which can be of any length or shape. Raised beds extend the planting season, can reduce weeds and they reduce the need to use poor soil.

In this lesson, learners consider design issues related to the construction and siting of raised beds. They also review language for making plans, plan, elevation, scale.

Vocabulary: Aspect, Elevation, Plan, Raised Beds, Scale

In this lesson, the learner will:
- gain an understanding of how raised beds are designed
- consolidate understanding of siting a vegetable garden.
- Develop a design for a raised bed system (extension task)

Materials
- Site Map
- Graph paper

ACTIVITY INSTRUCTIONS

Activity 1: What are raised beds? Making predictions (20 mins)

1. Put learners into groups of 3. Give them some time to discuss the following questions:

   a) What is a raised bed? How big should it be?
   b) What are some of the advantages of a raised bed system?
   c) What materials can you construct a raised bed from? Be creative! What are some of the advantages and disadvantages of the material choice?
   d) Are there any materials you should not construct a raised bed from?
   e) What are some important things to remember when choosing a site for a raised bed system?

   2. Share the Worksheet: Raised Beds and discuss the answers / worksheet as a class.

Activity 2 Siting a raised bed system (30 mins)

1. As a group, discuss the best place in the school to site your raised bed system.
2. Consider all the information from the questions and the worksheet to justify your site.

   ○ This may involve walking around the school grounds.

3. Using graph paper, draw a plan for the raised bed. To do this learners must

   ○ Decide on a scale, i.e. what does each square on the graph paper equal?

4. Have learners decide on what materials they could use

   ○ What materials would you use?
   ○ What are the dimensions of the bed in the plan and elevation?
   ○ Consider the information from activity 2 to help.

5. Once completed, create a list of materials needed per raised bed.

REFLECTIVE EXERCISE: 3-2-1 (10 mins)

- Three things they feel they have learnt from the tasks
- Two things they found most interesting and would like to explore more
- One – their opinion they have about the tasks

Use Post-its or a mentimeter survey - www.mentimeter.com - to gather reflections

EXTENSION / REDUCTION ACTIVITIES:

For a shorter class, Focus on Step 1 and include a walk around the school - Step 1 activity 2, step 1.

For a longer class, complete Activities 1,3, then create new groups of three so that there are representatives from different groups in each new trio. Share designs and ideas and ask learners to give each other feedback on improving their design.

For an additional class: Set up Step 3 as a peer assessment activity that learners can complete out of class. In the next class, each learner / group then gets another's design and has to provide written feedback on what they like about it and why, adding 1-2 improvements that they believe can be made to it.

This can then be shared and the best ideas taken to finalise a school raised bed system. Learners can also use the Food Pyramid resources (see media box) to help them with their initial designs.

Introduce one of the videos from the media box to consider how to build raised beds. Learners can discuss the best design / materials based on specific needs identified in Activity 3.

MEDIA BOX: (materials, online video links, extra resources, case studies etc)
Grow It Yourself How to build a raised bed (3:21min) https://www.youtube.com/watch?v=BpSopUk9diU

Step by Step (1:17min) https://www.goodhousekeeping.com/home/gardening/g20706096/how-to-build-a-simple-raised-bed/

Gardener' World article and Monty Don video (1:36min) https://www.gardenersworld.com/how-to/diy/how-to-build-a-raised-bed/ also has links further down to different types of raised beds

The Food Pyramid https://www.gov.ie/en/publication/70a2e4-the-food-pyramid/

LOCAL TRIP / EXPERTISE / ADDITIONAL WORK AND ASSESSMENTS

Go on a tour of raised beds in the local community with a representative of the local Tidy Towns group.

Visit a local community allotment for design ideas.

Invite a landscape designer to talk to the class about garden design.

MM4 L8 WS: DEVELOPING RAISED BEDS

1. What materials can be used for raised beds?
   - Anything really, timber planks, bricks, old logs, woven willow, etc.

- Timber planks- permanent, must be waterproofed, bricks- permanent, but heavy, sink into the ground and hard to "fix", Willow, logs – biodegrade and become a ridge system over time, decaying wood pulls nitrogen from the soil.
- Anything that's been pressure treated to prevent rot. Railway sleepers for example as the coatings leech into the soil and damage crops or are taken up by them.

2. Where should they be placed? Do you need to do more research? Consider the aspect, sunlight and shelter, proximity to compost, water supply, kitchen / or area where they will be used.

4. Raised beds (containers for growing food in) should be 8" to 18" high, wide enough to work both sides from one side or short enough that you don't have to walk too far to get around it.

5. Consider how you will control the growing conditions, i.e. Drainage, soil composition, easier to work.

- Using Logs - any found wood can be made to form the edges of a raised bed.
- 1 x 1 joints - a useful no screw raised bed.
- Corrugated tin with wooden re-enforcing both for strength, structure and aesthetic design.

- Bricks provide a rigid, strong and permanent raised bed. Some skill is needed to lay bricks, but once laid the bed will last forever.

- Willow offers a decorative container for raised beds, both supple and strong.
- This could also be developed using living willow, however, as willow likes water this may only suit certain planting designs or crop rotation.

- Cavity bricks are relatively easy to lay and offer bot edging for a raised bed with additional planters.
- This can be developed creatively to add an aesthetic aspect to your raised beds.
- They can also be treated with colour - again adding an additional visual quality to your planting schemes.

MM4: Growing and Foraging

Experimentation and Exploration

Lesson 9: Crop Rotation

Subjects: CSPE, English, Geography, Horticulture, Science

Lesson Title and Summary: Crop Rotation

Crop rotation focuses on growing a different crop on a given land area every growing/planting cycle and season. Crops are rotated for different reasons, but one reason is to break disease and pest cycles. In some areas of the world conventional agriculture means crops are rotated for a given land area either seasonally or yearly.

Learners will explore different aspects of growing vegetables using crop rotation, e.g. plant family, soil composition and nutrient cycles.

Vocabulary: Brassica, Crop rotation, Legumes, Manure, Mulch, Nutrient cycle, Plant family, Root, Solence

In this lesson, the learner will:

- begin to identify different plant families
- develop understanding of plant nutrients cycles
- consolidate their understanding of nutrient cycles
- learn how to add nutrients to soils using plants and other soil food

Materials

- Access to the internet/class set of tablets, computers

ACTIVITY INSTRUCTIONS

Activity 1: Introduction to crop rotation (15 mins)

1. Put learners into small groups to discuss the following questions:

   - Do you know what a crop rotation is? Why are crops rotated?
   - What does 'plant family' mean? Do you know any?

2. Review the answers to the first two questions as a whole class. See Support Sheet: Suggested responses.
3. Ask learners to list as many vegetables as they can in 1 minute (put on a timer!).

Activity 2: Plant Families (25 mins)

1. Write up the 4 plant families on the board:

   - Legumes: peas and beans
   - Brassica: cabbage, leafy
   - Root vegetables: carrots, parsnip, beetroot, onion
   - Solence: potato, tomato, peppers

2. In groups, sort the vegetables from the learners' lists created in their discussion into the family categories on the board.

3. Divide learners into 4 groups and assign each group a plant family. Give them 5-10 mins to research the nutrient needs of their family. They can use their phones or class tablets or alternatively, watch the Video: The Vegetable Families. Write the information on the board next to each family.

4. What nutrients do the plants in the family need to thrive? See Support Sheet: Suggested responses.

Activity 3: Sharing findings (10 mins)

1. Jigsaw groups so that there is a representative from each plant family in each new group.
2. Allow time for learners to share their findings and make notes on the other families.

REFLECTIVE EXERCISE: 3-2-1 (10 mins)

- Three things they feel they have learnt from the tasks
- Two things they found most interesting and would like to explore more
- One – their opinion they have about the tasks

Use Post-its or a mentimeter survey - www.mentimeter.com - to gather reflections

EXTENSION / REDUCTION ACTIVITIES:

Reduction (40 min lesson): For a shorter lesson, focus on Activities 1-2 and follow up with Activity 3 in the next lesson.

Extension (80 min lesson): For a longer lesson, spend more time on Activity 3, linking local growing to the 4 plant families.

Review different nutrient requirements for types of crops, talk about the use of different green manures and mulches, discuss in group how green manures and mulches can be added to your crop rotation. Use the video in the media box 'Cover Crops To Recharge Your Soil This Winter'.

Additional Lesson: Watch the video 'Crop Rotation made simple' and ask learners to think about how this might affect their garden design, ask them to attempt to do a 4-bed crop rotation plan.

MEDIA BOX: (materials, online video links, extra resources, case studies etc)

Video: 'Crop Rotation made simple' (7:48 min) https://www.youtube.com/watch?v=XeNA6XdMoF8

Video: GIY The Vegetable Families (5:43 min) https://www.youtube.com/watch?v=aXZcMk5RttE

Video: Cover Crops To Recharge Your Soil This Winter! (1:21 min) https://www.youtube.com/watch?v=XvERk9kwmVI

Bord Bia - Module 1 Audit, plan & Design a School Garden (8:55min) https://youtu.be/SzeMTnETSkw

Oakdene Nursery Allotment plan https://www.growveg.co.uk/garden-plans/872417/oakdene-nursery-allotment/2017/nursery/

Traditional Landscape Design vs Permaculture Landscape Design (11:50min) https://www.youtube.com/watch?v

Permaculture Ireland - https://permaculture.ie/map/

LOCAL TRIP / EXPERTISE / ADDITIONAL WORK AND ASSESSMENTS

Visit local growers or Tidy Town groups who are planting in the local community and discuss crop rotation with them.

Invite a local grower to come in and talk about crop rotation and do an analysis of any existing raised beds in the school.

Consider contacting a Permaculture specialist (see media box) to advise learners on their designs.

MM4: Growing and Foraging

Experimentation and Exploration

Lesson 10: Investigating Herb Beds and Garden Designs

Subjects: CSPE, English, Geography, Horticulture, Science

Lesson Title and Summary: Investigating Herb Beds And Garden Designs

When you grow your own garden, you take control of what and where you want to grow. You decide what is put on your plants and into the soil. Designing a well-thought out herb bed, with complementary planting, encourages good growing.

This lesson encourages learners to apply design skills to planting and growing, by creating a herb bed garden design.

Vocabulary: Annual, Edible Weeds, Growing, Harvesting, Herbs, Perennial, Tips

In this lesson, the learner will:

- develop design-thinking skills
- collaborate and communicate with their peers
- reconnect with food, nature and community
- explore garden planning
- research and practice garden designing
- sketch and scale drawings

Materials

- Worksheet: Investigating Herb Beds & Garden Designs
- Internet/ Computer access
- Canva Free layout / design software
- Technical drawing materials - pens, pencils, rulers

ACTIVITY INSTRUCTIONS

Activity 1: Investigating Herb Beds And Garden Designs (25 mins)

1.) Divide the class into 4 groups. Each group is responsible for one quadrant of the plan (see WORKSHEET: INVESTIGATING HERB BEDS and GARDEN DESIGNS).
Groups: North-West, North-East, South-West, South-East

2.) Go through instructions on the worksheet to check understanding. Give groups 20 minutes to complete Steps 1-4 of the worksheet.

Activity 2: Share findings (10 mins)

1.) Learners share findings with peer groups. This may be done through group rotation.

Activity 3: Starting to Design a Herb Garden (15 mins)

1. Watch the Video: Designing a Herb Garden (5:32min)

2. Using the learners directory from Lesson 4, the edible Medicinal micro-module and Lesson 7 in this micro-module, Directory Addition Herbs begin to design a herb garden for the school.

Completing the design will take a number of lessons and learners can consider the following types of herb gardens:

- scented
- cosmetic
- edible
- medicinal
- Italian
- container-grown

Once the design is complete, learners can begin to build / create their herb garden.

REFLECTIVE EXERCISE: 3-2-1 (10 mins)
- Three things they feel they have learnt from the tasks
- Two things they found most interesting and would like to explore more
- One – their opinion they have about the tasks

Use Post-its or a mentimeter survey - www.mentimeter.com - to gather reflections

EXTENSION / REDUCTION ACTIVITIES:

Reduction (40 min lesson): For a shorter lesson, learners may research only a selection of the listed herbs in their quadrant and the remainder be divided and set for individual study.

Extension (80 min lesson): For a longer lesson, more time may be allocated to the research stage and the sharing findings stage.

Additional lessons: Use the resources in the media box to develop designs for the herb garden, e.g. formal, scented, edible, Italian, container-grown.

MEDIA BOX: (materials, online video links, extra resources, case studies etc)

Video: Designing a Herb Garden (5:32min): https://www.youtube.com/watch?v=VTFLtfA4KEw

Video: Herb Garden planting(11:52min): https://www.youtube.com/watch?v=VTFLtfA4KEw

Article: Planning a Herb Garden: https://www.thespruce.com/planning-a-herb-garden-1402617

Website: https://www.gardeningknowhow.com/edible/herbs/hgen/herb-garden-designs.htm

Chelsea Physic Garden: https://www.chelseaphysicgarden.co.uk/

Video: Containers (13:21min) https://www.youtube.com/watch?v=JQNrfMT8Dhw

Video: An Introduction to Soil (12:52min) https://www.youtube.com/watch?v=I3A7OnTLSM8

Canva Graph Paper use for basic layout and add visual elements like walls / planting - https://www.canva.com/p/templates/EAE4Z3cEKSM-simple-graph-paper-for-maths-and-science/

Concept Design $49: The Landscape & Garden solution, 14 libraries of containing 420 vector graphics shapes, to allow you to create professional looking documents. https://www.conceptdraw.com/solution-park/building-landscape-garden

## LOCAL TRIP / EXPERTISE / ADDITIONAL WORK AND ASSESSMENTS

Visit local gardens/parks with different layouts or take a virtual tour of a garden with different layouts. Examine how planting has been organised.

Map the local expertise that could help with designing and growing - local colleges, food producers.

MM4 L10 WS: INVESTIGATING HERB BEDS & GARDEN DESIGNS

Step 1: The teacher will divide the class into 4 groups. Groups will work on one of the quadrants below:

Groups:

North-West   North-East,
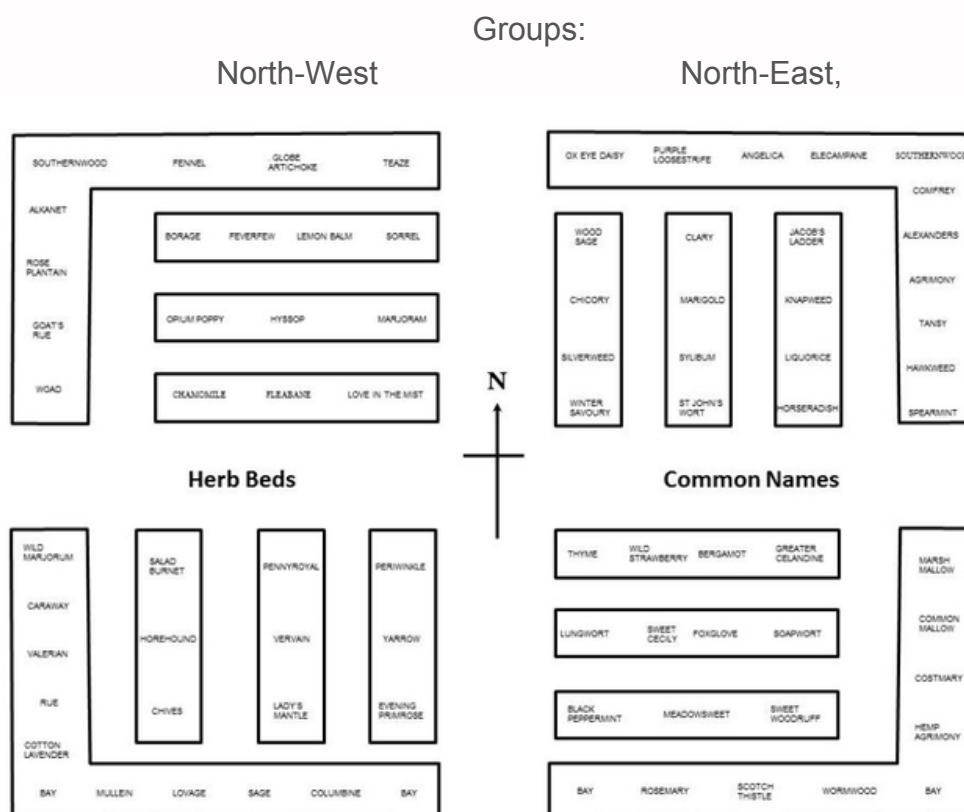
Step 2: Working in your groups look at the example garden plan above. Focus on your group's quadrant.

- How would you describe the layout?
- What are the herbs listed in your section?
- Circle the ones do you already know of.
- Highlight the ones you don't yet know about.

Step 3: You can see that the herb beds have the common names of plants.
In your groups;

- Record the botanical names of plants in your area of the plan.
- Find and save images of each of them.
- Display your information in a format of your choice (mind map, poster, etc.).

Step 4: Share your findings with the other peer groups of your class.

Step 5: Upload findings to class' DIRECTORY OF LOCAL EDIBLE / MEDICINAL FLORA

MM4: Growing and Foraging

Experimentation and Exploration

Lesson 11: Composting

Subjects: CSPE, English, Geography, Horticulture, Science

Lesson Title and Summary: Composting

Composting is a process by which organic matter, like leaves and food scraps, decomposes into soil.
It's a great way to recycle scraps from the garden and kitchen to enrichen the soil, improving water retention, and protect against erosion.

Vocabulary: Anaerobic digestion, Compost, Vermiculture

In this lesson, the learner will:

- gain an overview of various composting methods
- consolidate their understanding of the processes involved in turning organic waste into usable compost
- explore the design issues relating to the construction and siting of a compost area
- introduce/reinforce terminology for composting: hot/cold, vermiculture, anaerobic digestion

Materials

- White / Blackboard
- Internet Access

ACTIVITY INSTRUCTIONS

Activity 1: Activate knowledge on composting (15 mins)

Write the prompts below on the board in advance of the lesson.

- *What is composting?*
- *What can and can't be composted?*
- *What are some of the things you need to think about when starting to compost?*
- *How does the composting process happen?*
- *What does aerobic/anaerobic mean?*
- *What is Vermiculture?*

1. Working in pairs have learners discuss / find out the meaning of the discussion prompts and make notes on their findings.
2. Go through the ideas as a class and make notes on the board.

Activity 2: Green & Brown Material Identification (15 mins)

1. Watch the VideoL The Compost Story (6:46 min).
2. Ask learners to find out the difference between Green and Brown compost material
   (Green materials are high in nitrogen and moisture, and Brown materials are high in carbon and low in moisture).

2. Working as a class, develop a list of green / brown composting materials, learners can use their phones / access the internet that can be used within composting.
3. Review each item and acknowledging that a compost bin needs a good mix of green and brown materials.

Activity 3: Thinking about a composting area (20 mins)

1. Form small groups of 2-3 people.
2. Put a question on the board, 'What is the best plan for a composting area in our school?' and the following questions:

   - What is the best location?
   - What size should it be?
   - What materials could you use? New or recycled?
   - What are the issues your design must mitigate against?
   - What are important issues with the siting of your compost area?
   - Can your design speed up the composting process?

REFLECTIVE EXERCISE: 3-2-1 (10 mins)
- Three things they feel they have learnt from the tasks
- Two things they found most interesting and would like to explore more
- One – their opinion they have about the tasks

Use Post-its or a mentimeter survey - www.mentimeter.com - to gather reflections

EXTENSION / REDUCTION ACTIVITIES:

Reduction (40 min lesson): For a shorter lesson, complete Activities 1 and 2, and introduce Activity 3 as an at-home writing task.

Extension (80 min lesson): For a longer lesson, use the questions in Activity 3 as a mini-research task, with learners working in small groups, including siting and making compost.

Additional Lesson: Focus on outcomes for Activity 3 and implement installing school composting.

MEDIA BOX: (materials, online video links, extra resources, case studies etc)

Video: The Compost Story (6:46 min) https://www.youtube.com/watch?v=bqDQD8cvO5Y

Video: Making Compost the simple way (9:20min) https://www.youtube.com/watch?v=swLkA1cHJ4Y

Video: What Happens When You Bury Kitchen Scraps? (11:58 min)
https://www.youtube.com/watch?v=yQFB9M2UdK0

Website: https://www.gardeningknowhow.com/composting/basics/compost-vs-humus-in-garden.htm

Website: Stop Food Waste https://stopfoodwaste.ie/resources/composting

Website: Composting 101 https://www.nrdc.org/stories/composting-101

LOCAL TRIP / EXPERTISE / ADDITIONAL WORK AND ASSESSMENTS

Organise a visit to your local Tidy Towns representative or community garden to see composting in action. Alternatively, you could ask the person in your school responsible for composting to give students a talk and lead through of the process in the school.

Contact Stop Food Waste to see what support they can offer your school
https://stopfoodwaste.ie/contact-us

ACTIVITY 1: ACTIVATE KNOWLEDGE ON COMPOSTING

1 - Suggested responses to questions:

- Composting is the breakdown of organic material. Any organic material can be composted. Cooked food, dairy, fish or meat shouldn't be composted as they may attract mice and rats (vermin). Any plant material that looks like it has a fungal or bacterial infection shouldn't be composted as it could spread the infection.
- Where to place your composter. What to compost- you need a mix of green (plants, veg scraps) and brown (cardboard). What issues there might be- smell, vermin.
- Composting happens with bacteria, fungus, and animals: worms, slugs, other insects. Bacteria and fungus colonise the heap first, animals second.
- With/Without oxygen.
- Introduce hot and cold compost, vermiculture, anaerobic digestion:

  - Hot: In piles larger than 1m sq. Bacteria/fungus- heats pile to 50 –70c.
  - Cools down after about a week. Animals colonise the heap.
  - Cold: smaller amounts, bacteria/fungus/animals all at once
  - Vermiculture: very small amounts, worms mainly, no acid material, very rich.
  - Anaerobic digestion: without oxygen, cooked food, meat, fish, dairy. Produces methane.

Brown carbon-rich	**Green** nitrogen-rich
• dry leaves	• table scraps
• straw and hay	• fruit scraps
• shrub prunings	• vegetable scraps
• pine needles/cones	• fresh grass clippings
• chopped twigs/branches	• lawn and garden weeds (if they have not gone to seed)
• wood ash	• flowers
• newspaper	• seaweed and kelp
• shredded paper (avoid glossy paper)	• chicken manure
• cardboard (shredded)	• coffee grounds/filters
• corn cobs, stalks	• tea leaves (loose or in bags)
• dryer lint (from natural fibers)	• corn cobs, stalks
• sawdust (from untreated wood)	• hedge clippings
• eggshells	• garden waste
• brown paper bags (shredded)	• fresh leaves

SDG 15 Seeding Sustainability
MM4 Growing and Foraging

MM4: Growing and Foraging

Experimentation and Exploration

Lesson 12: Tree Planting

Subjects: CSPE, English, Geography, Horticulture, Science

Lesson Title and Summary: Tree Planting

By planting trees, we contribute to the environment over long periods of time as they provide oxygen, improve the quality of air, improve climate, conserve water, preserve soil, and support wildlife.

In this lesson, learners will be introduced to the life cycle of trees, the difference between bare root and potted trees, and review language related to trees.

Vocabulary: Bare Root, Deciduous, Evergreen, Life Cycle, Nurse Crop, Potted

In this lesson, the learner will:

- begin to understand the life cycle of trees
- gain an understanding of the advantages and disadvantages of bare root and potted trees
- explore different methods of planting trees
- explore options for planting trees on site

Materials

- Worksheet: Tree Planting & Identification
- Images: tree-part identification, bare root and potted trees
- Tablets/access to computers and the Internet
- Site map for planting

ACTIVITY INSTRUCTIONS

Activity 1: Tree Identification (20 mins)

1. Using Worksheet: Tree Planting & Identification, get learners working in pairs to answer the following questions, using the internet to search for information.

   - What is the difference between deciduous and evergreen trees? Give some examples of each.
   - How do trees change as the seasons pass? Can you identify a growing and dormant season?
   - Can you identify the various parts of a tree? Label the image on the worksheet.
   - How does planting distance affect tree growth?
   - Do you know what a nurse crop is?

2. Share answers with another pair and then as a whole class.

Activity 2 The difference between bare root and potted plants (10 mins)

1. Show learners images of bare root and potted plants and ask them to discuss the following questions in groups of 3. They can use the Worksheet to compile their answers.

   - When can you plant bare root and potted trees?
   - Can you think of some advantages and disadvantages for both types?
   - Which do you think would be the most difficult to plant? Why?

Activity 3 Choosing where to plant trees on site (20 mins)

1. Working in groups using a site map, identify areas where trees can be planted. Keep in mind how you would like to define the spaces within the site and what has been learned about planting distances.
2. After 10 mins, form new groups (with at least one member of each group in a new group). Explain and discuss your planting design with other members of the group.

REFLECTIVE EXERCISE: 3-2-1 (10 mins)
- Three things they feel they have learnt from the tasks
- Two things they found most interesting and would like to explore more
- One – their opinion they have about the tasks

Use Post-its or a mentimeter survey - www.mentimeter.com - to gather reflections

EXTENSION / REDUCTION ACTIVITIES:

For a shorter class, extend the time of Activity 1 &2 and set Activity 3 as homework to be discussed in groups in the next lesson.

For a longer class, increase the amount of time in Activity 3 and spend time condensing the group designs into one class planting design.

Additional Classes: Learners can search for free trees or contact Trees on the land or Trees for Secondary schools to get free trees and organise planting sessions. This includes watching videos that instruct on planting trees.

MEDIA BOX: (materials, online video links, extra resources, case studies etc)

Tree Information https://www.treecouncil.ie/native-irish-trees

Video: Tree Positioning https://www.youtube.com/watch?v=d5FiqoypXfo

Video: Notch Planting (1:18min)https://www.youtube.com/watch?v=foSRWkDl1Cg&t=6s

Planting Hole https://www.gardeners.com/how-to/planting-bare-root/8764.html

Planting Advice https://connectingtonature.ie/blogs/news/how-to-plant-bare-root-hedging-and-trees#:~:text=The%20best%20year%20for%20planting,of%20your%20trees%20have%20moisture. or https://www.bowhayestrees.co.uk/planting-guides

Coillte woodland restoration projects https://www.woodlandrestoration.ie/

Green Schools biodiversity resources https://greenschoolsireland.org/themes/biodiversity/

Trees for Secondary Schools - Free Trees https://treesforsecondaryschools.ie/

Trees on the Land https://www.treesontheland.com/plant-trees

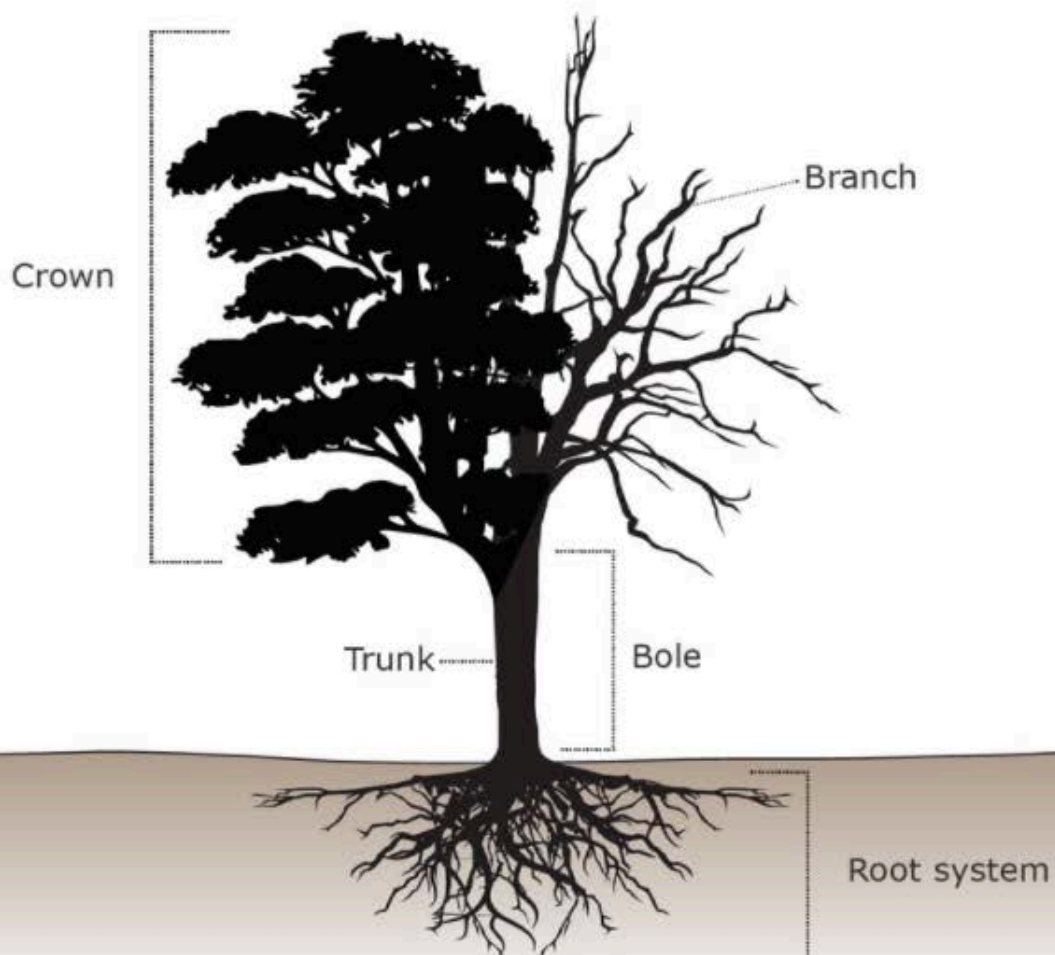**LOCAL TRIP / EXPERTISE / ADDITIONAL WORK AND ASSESSMENTS**

Invite allotment growers or a representative from Tidy Towns to discuss tree planting in the local area.

Organise a tree-planting day in the community. Involve learners in the Tidy Town plans.

Invite a local landscape designer to help put the tree planting on site into action.

Crown

Branch

Trunk

Bole

Root system

MM4 L12 TG: TREE PLANTING & IDENTIFICATION

TEACHER'S GUIDE

ACTIVITY 1: TREE IDENTIFICATION

Suggested responses:
a) Deciduous trees lose their leaves, evergreen trees do not.
   Deciduous: ash, birch, oak, alder, hazel, etc.
   Evergreen: holly, pine, fir, cedar, etc.

b) Trees grow from spring until autumn. The majority of growth takes place during the summer months. Deciduous trees lose their leaves during the autumn. The dormant season occurs when there are no leaves on deciduous trees, cold temperatures and less sunlight.

c) Limb: off trunk and supports a number of branches. Branch: off of the limb and is more t than one year old, Twig: this year's growth, Tap root: goes straight down from the main trunk and keeps the tree stable, lateral roots: grow away from the tree and stabilise soil.

d) Trees planted closer together will grow taller and straighter, further apart will grow bushier. Plant closer to create hedges, further apart create shelter belts and individually as specimen trees. How we choose to plant trees encloses space and provides shelter, interest to a space. Planting distances are hedge: two rows 30-45cm apart 5-7 trees per meter, Shelter belt: 2 - 5 rows 4-6 meters apart 1 meter between trees, specimen trees 2-4 meters apart.

e) A nurse crop is a fast growing tree that is grown with a slower growing tree. Growing them together provides benefits to the slower growing tree. Birch and Alder are popular nurse trees for Oak. Oak is slow growing and spends a lot of its early establishment increasing its roots. Oak is quite vulnerable in its early years so growing it with Birch and Alder provides shelter and encourages the Oak to grow more upright with fewer lateral branches.

TEACHER'S GUIDE

ACTIVITY 2: THE DIFFERENCE BETWEEN BARE ROOT AND POTTED PLANTS

Suggested responses:

a) Bare root trees can only be planted in the dormant season, potted trees can be planted year round.

b) Bare root are easier to store, transport, and are much cheaper but can only be planted during the dormant season. Potted trees can be planted year round.

c) Bare root are more difficult to plant. It's easy to damage the roots during planting, the most important thing is to make sure that the tree is planted at the same soil level as it was growing in its original location. Identify the top most root, this needs to be just below soil level.

bare root   potted

15 LIFE ON LAND

Working with a partner, answer the following questions. Before you begin to research the answers, underline the key words in each question. Use these key words to search online for information.

a) What is the difference between deciduous and evergreen trees? Give some examples of each.

b) How do trees change as the seasons pass? Can you identify a growing and dormant season?

c) Can you identify the various parts of a tree? Label the image.

Parts of a tree
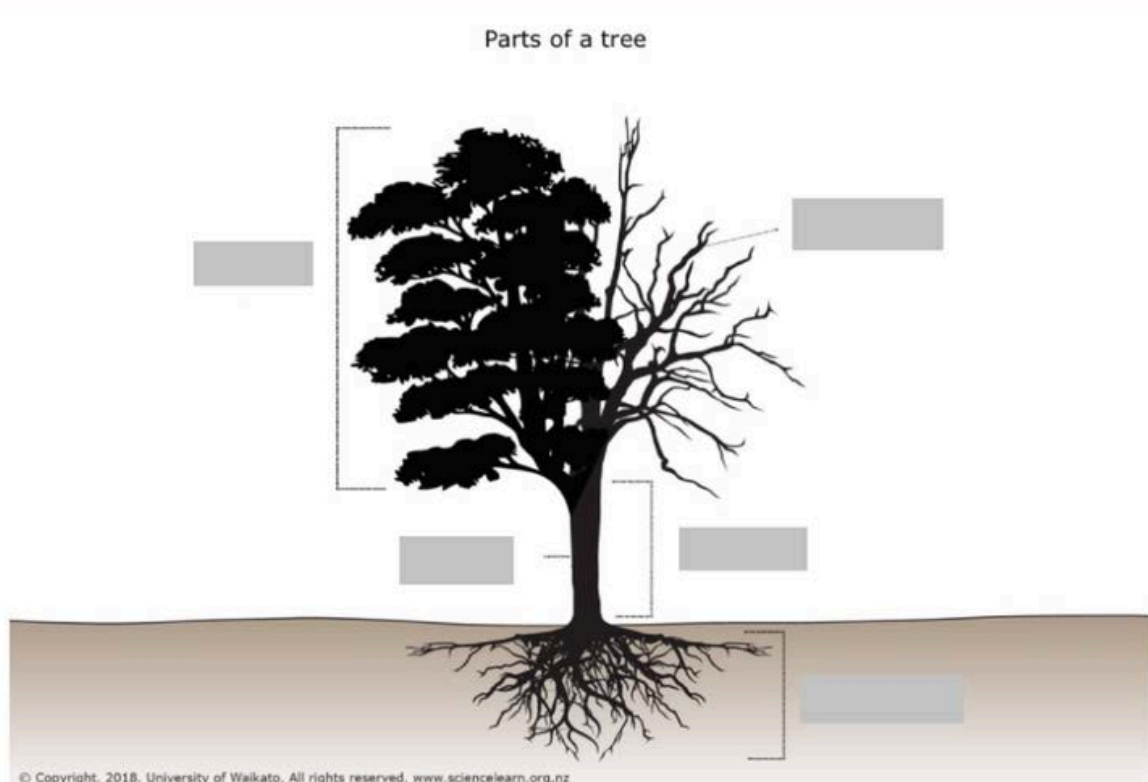
d) How does planting distance affect tree growth?

e) Do you know what a nurse crop is?

2. Working in groups of 3, take one question each. Research your answers for 2 mins and then share between you before a whole class discussion.

a) When can you plant bare root and potted trees?

b) Can you think of some advantages and disadvantages for both types?

c) Which do you think would be the most difficult to plant? Why?