Green Guardians: Cultivate, Care and Sell (Level 3)

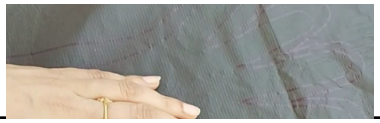
Description	Learners will explore the steps followed in cultivating crops and growing their own plants. They will then design an irrigation/ agricultural tool. Finally, they will set up a farmer's market in which they will sell their produce and the irrigation/ agricultural tool that they designed.
Leading question	Can you cultivate and sell your own crops?
Subjects covered	Science, Art and Design, English, Math
Total time required	40-60 minutes a day for 5 days
Resources required	Seeds of different varieties, sticks to dig holes, gloves, forks or sticks/wooden or metal rulers, pots and troughs, sprouted seeds, fertilisers, soil, colour pen/pencil, paper ***Note:*** *A week before the start of the project, please sprout some seeds that germinate easily and in less time like wheat, mustard, pulses like moong and chana, or fenugreek. These sprouted seeds/seedlings will be planted by students on Day 2.*
Learning outcomes:	By the end of this project, learners will be able to: Knowledge-Based Outcomes: 1. Describe sowing and transplantation as two planting techniques and use them to grow their own crops.. 2. Design and create irrigation models suitable for small gardens or potted plants. 3. Explain the concept of profit and price their products with a predecided profit margin. 21st Century Skill Outcomes: 1. Think critically while analysing suitable methods of planting and designing their irrigation tools. 2. Communicate their ideas effectively using drawings and while briefing potential customers at their stalls. 3. Collaborate with peers or adults to receive feedback. 4. Work creatively to design an irrigation tool and set up a farmer's market.
Previous Learning	None
Supervision required	Medium

Day 1 -

Today, you will learn about how much water we use in our daily lives.

Time	Activity and Description

10 minutes	**Farm to Table** Let's begin by finding out what you already know about farming. - If food has to reach from the farm to the table, what do you think are the steps followed by farmers to cultivate them? - List down the steps in your notebook. (*Farm to Table Journey:* 1. *Preparing the soil: Farmers prepare the soil by carefully turning it over, ensuring it is adequately aerated and loosened.* 2. *Sowing the seeds: They sow the seeds into the prepared soil.* 3. *Taking care of the plants: Farmers diligently tend to the crops by giving water and providing necessary care.* 4. *Harvesting and Selling: Once the crops are harvested, they are sold in the market. Consumers buy these products from the market, thus completing the journey of food from the farms to our tables.)* ***Note:** Ask learners to share, applaud them for the correct steps they mention and allow them to self-correct using questions as prompts. For example, if a learner says step 3 before step 2, you can ask questions such as what will they take care of? Have they grown anything yet? etc. List the headings of the four steps on the board as learners arrive at these steps.* Now that we know the process of farming, we will use the next few days to implement the steps we discussed so that we can then assess if we could succeed as farmers or not.
20 minutes	**The 'What-if' Game** ***Note:** If possible, take the learners out to the garden area to conduct this activity. If learners cannot access a garden area, instruct them to imagine and list or draw the steps they would follow to sow the seeds.* - Let's play a game to find out how we will carry out these four steps as part of this project! - Let's play a game called 'What-if'. In this game, you have to think 'what-if' you were a farmer, what would you do? ***Note:** Give each learner a few seeds (wheat, mustard, beans, gram, etc.) and sticks to dig holes. Ask them to imagine that they are a farmer.* - How will you plant the seeds? - Try doing it and list the steps that you followed. - What steps did you follow? (*Invite a few responses from the learners. Expected Response: 1. We dug holes in the soil. 2. We sowed the seeds. 3. We covered the seeds with soil.*) - The method you used is one way of planting seeds. This method is called direct sowing. - In this project, you will be exploring another method of growing plants known as transplantation. - After you have sown the seeds, what would you do to take care of the plants? (*Water the plants regularly, add manure and fertilisers, remove weeds and pests, etc.*)

	- One of the important ways to take care of plants is by watering them regularly. We will be designing a tool to water the plants as part of this project. - Now, imagine you have harvested the crops, what will you do next? - You will sell your produce. We will do something similar in this project. You will organise a farmer's market where you will sell the crop you have grown and the model of the irrigation tool you designed. You will invite your friends and family members to come to the market and buy your products using play money. - Before we go further, let's first think of a theme for the farmer's market that you will organise.
10 minutes	**The Theme for the Farmer's Market** You will organise a farmer's market to sell the plants you grow and the irrigation tools you make. - Think of a theme you would like to use for the farmer's market. - A theme is a central idea around which you can design your stall in the farmer's market. - You can decide the theme based on the plants you will be growing. **Tip:** *Give some thinking questions to help learners arrive at the theme. For example:* - *what are the uses of the plants that you are going to?* - *Can you create a recipe using the plants you grow?* - *Do your plants have any health benefits?* *Get learners to grow seeds that germinate quickly (such as mustard, wheat or green gram) and let them know which seeds they will grow so that they can decide on the theme based on this information.*
At-home activities	- Think of ways you can show the theme of the farmer's market in your stall. Note down your ideas in your notebook. - Get a pair of gloves for the next class for the planting exercise. Alternatively, create gloves using the following steps at home and bring them to the next class:  Step 1: Take a garbage bag or dustbin cover.  Step 2: Trace the outline of your hand on the garbage bag using a sketch pen/marker.  Step 3: Draw an outline around the traced hand print.  

EAA welcomes feedback on its projects in order to improve. For feedback please use this link
https://forms.gle/pVXs3vQEufuzSShs7

	Step 4: Use a heated knife to cut along the outline. Step 5: Your garden gloves are ready to use. Reference link to understand the steps to create garden gloves: https://www.youtube.com/watch?v=YEDh1zuWBkk

Day 2

Today, you will plant the seeds using direct sowing and transplantation, and learn about irrigation.

Time	Activity and Description
10 minutes	**Introduction to the Two Planting Techniques** Today, you will be planting the seeds using two different techniques – direct sowing and transplantation. - Direct sowing is a method used by farmers to sow the seeds directly in the field. The activity we did in the last class in which you made holes and planted the seeds is an example of direct sowing. This method of direct sowing is known as **drilling**. Farmers use another method of direct sowing known as **broadcasting**. In this method, they scatter the seeds using their hands or machines.  The Broadcasting Method  A Seed Drilling Machine - **Transplantation** is a method of growing plants in which instead of sowing seeds directly, some crops are first grown as seedlings and then transplanted into the field. This method is commonly used for crops like tomatoes, peppers, cabbage, and lettuce. Seedlings are grown in nurseries or greenhouses and later transferred to the farm once they have reached a certain size or maturity.  Transplanting Rice Seedlings
15 minutes	**Planting Exercise** Today, you will be doing the planting exercise. ***Note:*** - *In the case of more than one learner, have one learner use the direct sowing method and the other transplantation. In the case of one learner, give them to choice to pick one to do in class and the other at home.*

	- *Take the learners to the planting area. Arrange pots for learners who will be using the direct sowing method and troughs for learners who will be transplanting. Give each group some soil and fertilizer.* Prepare the soil for planting. To prepare the soil, use the tool/stick/ruler to turn over the soil and mix fertilizer in the soil. Wear your gloves before you start preparing the soil. - Put this soil mixture in the pots or troughs. - Since we have to grow plants from seeds, we will use sprouted seeds so that your plants can grow faster. ***Note:*** *Give learners a few sprouted seeds. You can choose seeds that sprout easily within a couple of days and sprout them a week in advance. Some examples of such seeds are mustard, fenugreek, wheat, and pulses like moong or chana.* Examine the sprouted seeds for any visible signs of damage, discolouration, or mould. Good quality sprout seeds are usually well-formed and free from any signs of deterioration. - Separate good quality sprouted seeds from the damaged ones. - Now, dig holes and sow the good quality sprouted seeds in the pot/ trough. Those who have sowed the seeds directly will plant them in a pot, while the others who have to transplant the seeds will plant them in a trough. - Make sure you do not plant the seeds too deep into the soil because then it will not sprout. The sprouts would have rootlets growing out. Keep them below the soil. Allow only a thin layer of soil to be above the seeds. Also, remember to plant the sprouted seeds a little away from each other. Do not plant all the seeds in one place in the pot/trough. - Once you have sown the seeds, water the pot or trough. - Now, clean up the workspace and your tools. Keep everything back in its proper place. ***Tip:*** *Depending on how fast the learners can understand and implement instructions, you may choose to provide pre-mixed soil (soil mixed with fertilisers) in pots/troughs and focus only on the planting aspect.*
10 minutes	**Watering the Plants** Can plants grow without water? (*No, they need water, air, sunlight, and healthy soil to grow.*) - We know that water is one of the essential requirements for plants to grow. But do all plants need the same amount of water? - What happens when you give more or less water than what the plant needs? Let's find out. - Look at these pictures and identify which one is underwatered, overwatered, and appropriately watered. ***Note:*** *If learners are unable to observe the picture, describe each plant and explain.*   

	 - Plant A is underwatered as it has wilted, yellow leaves. - Plant B is appropriately watered as it has upright leaves that are neither yellowing nor wilted or burnt. - Plant C is overwatered as the tips of the leaves look burnt. ***Tip:*** *If your learners have difficulty understanding the impact of overwatering or underwatering the plants, please show them real plants that have been over or under-watered. For advanced learners, you may also discuss and show samples of the amount of water absorbed by different types of soils, and the impact it has on plant growth.*
5 minutes	**Introduction to Irrigation** Just like you water the pots or troughs, farmers also water their fields. The process of watering plants on farms to ensure good yield is called **irrigation**. There are different methods of irrigation. In the next couple of classes, you will design and create simple irrigation models that can be used to water a small garden or potted plants. Remember, your models will be a part of the final presentation!

Optional Literacy Activities	**Nurturing Myself**
	- Just as plants need water, sunlight, and soil/nutrients to nurture themselves, we also need a healthy environment to grow and develop.
	- Write a short paragraph on the things you need to nurture yourself and grow into happy and healthy individuals. Think of not just food, clothes, and shelter, but also a healthy environment that everyone needs.
	- Follow the following guidelines while writing the paragraph:
	  - Your paragraph should have an introduction, a main body, and a conclusion.
	  - Aim for a paragraph that has around 6-8 sentences.
	  - Use clear and crisp language and ensure that your paragraph has a smooth flow.
	  - Proofread your work for grammar, punctuation, and spelling mistakes.
	Tips: *If your learners struggle with writing, give them sentence starters for the introduction, main body, and conclusion. For beginners, give them a cloze passage in which the learners need to fill in a few blanks to complete their paragraph.*

Day 3 –

Today, you will design an irrigation tool and finalise the materials required to create a model of the tool. You will also start your preparation for the farmer's market.

Time	Activity and Description

5 minutes	**Recap and Reflection Time** *Guide learners to recap what they did in the last class, and reflect on their experience. Use the following questions for recap and reflection:* - What did we do in the last class? - What did you find the most interesting? - Which planting method do you think will yield better results? Why?
15 minutes	**Designing the Irrigation Tool** Think about ideas for the design of the irrigation tool you would like to create. As you do that, remember that your tool should fulfil the following criteria: - It can be used to water potted plants or a small garden. - It should cause minimum wastage of water. - It should be made using materials easily available in the learner's environment. Once you have your ideas in place, draw what the tool would look like on a sheet of paper. ***Note:*** *After drawing, ask learners to list the materials they would need to create the model in the next class. Remind them that the materials should be easily available in their environment. For example, materials they can use could be pipes, bottles, etc.* ***Tip:*** *If your learners struggle with creating the design of the irrigation tool, you may give some ideas such as using shoe strings for drip irrigation, or using a plastic bottle with holes for sprinkling water, etc. Helping learners with some prompts will enable them to understand their expectations from them.*
10 minutes	**Feedback** Share your design with a peer/adult and receive feedback on the following: - What did you like about the design? - Will the design be useful to water potted plants or a small garden? - Does the design ensure minimum wastage of water? - Does the design use materials that are easily available to them? - What can be made better? Make note of the feedback and make any necessary changes to the design or materials required.
10 minutes	**Preparation for the Farmer's Market** Take out your notebook where you had written the ideas to represent the theme of the farmer's market in your stall. - Decide what materials you would need to put up your stall. Make sure you use things easily available in the environment. - In the next class, you will be creating the model of the irrigation tool and setting up your stall for the farmer's market.
At-home activities	- Complete the design of your irrigation tools. - Please bring the necessary materials for building the model of the irrigation tool and setting up your stall at the farmer's market to the next class.

Day 4 –

Today, you will create a model of the irrigation tool and decide the pricing of the products (crops and irrigation tools). You will also set up your stalls for presentation in the next class.

Time	Activity and Description
15 minutes	**Model of the Irrigation Tool** Create a model of the irrigation tool you designed in the last class. Remember, your irrigation tool must fulfil the following criteria: - It can be used to water potted plants or a small garden. - It should cause minimum wastage of water. - It should be made using materials easily available in the learner's environment. This model will be a part of the final presentation in the next class.
15 minutes	**Preparation for the Farmer's Market** ***Note:*** *Distribute a sheet of paper to each learner.* In the next class, you will be organising a farmer's market. In this market, people will come and check your products. Your products are the plants that you have grown and the tools that you have created. - As a farmer in this market, you have to sell your products to the people visiting your stall. - So, think about how you will sell your products. Write a script of 3-4 lines for each product that you will use to attract the customers to buy your products on the sheet given to you. ***Tip:*** *Guide the learners who may struggle to come up with a script for selling their products by giving some prompts. For example, think how this product is useful, and what are its unique properties (like an irrigation tool that ensures efficient usage of water or how easy it is to use).* - Decide the price of each product. It cannot exceed $ 10 because each person coming to the farmer's market will be given 'Play' money worth $ 10. You will be creating these currencies at home. - As you decide the price of the products, think of why you are proposing that price. What makes some things more expensive than others? - Create price tags and place them on your products. ***Note:*** *Show learners the space where they will set up the farmer's market.* - Think of ideas to decorate your stall so that it attracts customers. - When you go to the market, what are the features of a shop that attract you? - Decide the materials you would need to decorate your stall.
10 minutes	**Transplanting the Seedlings** Those of you who had planted the seeds directly into the pots will water their plants and observe the growth of the seedlings. - Those of you who had planted the seeds in a trough will carefully remove the seedlings from the trough and re-plant them in a pot. Be careful while removing the seedling. Do not harm the roots. Use your gloves while transplanting. - This method of removing the plant from one location and re-planting it at another place is known as **transplantation**.

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- Why do you think transplantation is done? What are its advantages?
- Transplantation helps in improving plant health. Farmers grow seedlings and transplant only the healthy ones onto the field. This helps remove diseased or damaged plants and allows the growth of healthy plants.
- Transplantation is also done to accommodate seasonal changes. For example, in a very cold season, plants can be moved to a greenhouse or a warmer area. They can be transplanted once the weather becomes warmer. Similarly, in places with extreme heat, plants can be transplanted to shadier areas to prevent stress and sunburn.
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<tr><td>At-home activities</td><td>
- Make sure your irrigation tools are ready for sale in the next class.
- Prepare price tags for each product you plan to sell in the farmer's market (if not done in class).
- Create or arrange for the materials to be brought for your stall in the farmer's market to the next class.
- Prepare posters/promotional materials to invite your family to the farmer's market. Your poster must include the date and time when the farmer's market would open. You may draw pictures, include the name of your stall, and a catchy slogan to attract your invitees.
- Prepare fake currency notes to be used in the next class. Each buyer will get $ 10.
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<tr><td>Optional Numeracy Activities</td><td>
Understanding Profit
To be a successful farmer, what do you think you need to do? Take a minute to think and write down your thoughts in your notebook.
- Besides taking care of your plants and ensuring they grow properly, farmers also need to sell their products at a price that gives them profit.
- What is profit? How can you earn a profit by selling something?

Profit is the extra money you make when you sell something for more than it costs you to make or buy. To make a profit, you must know how much it costs you to make or buy the product. On that, add a certain amount and sell it at the increased price. The difference between the cost price and the selling price is your profit.
- To calculate the cost price, draw the following table in your notebook and fill it up:

<table>
<tr><th>Material Bought</th><th>Quantity</th><th>Cost of One Unit</th><th>Total Money Paid</th></tr>
<tr><td>Seeds</td><td></td><td></td><td></td></tr>
<tr><td>Tools used</td><td></td><td></td><td></td></tr>
<tr><td>Pots/Troughs</td><td></td><td></td><td></td></tr>
<tr><td>Materials to support the growth of seedlings (like manure, and fertilisers)</td><td></td><td></td><td></td></tr>
<tr><td>Total Cost Price</td><td colspan="3"></td></tr>
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	Note: *Guide the learners to fill the table by letting them know the cost of one unit of each of the things mentioned above so that they can calculate the total price based on your inputs. Remind the groups that have transplanted the seedlings to include the price of the trough as well as the pot.* - Now, think of the profit you want to earn by selling the plant. Add that amount to your cost price. This will be your selling price. However, be careful not to quote a very high price because then who will buy your product? - Do the same exercise for your irrigation tool. Think of the cost of materials you used to make the model. Add your profit to the cost price to decide the selling price. - *Stop and Jot:* Based on this exercise, what is the formula for calculating profit? (Profit = Selling Price – Cost Price)

Day 5 -

Today, you will set up your stalls and sell your products in the farmer's market.

Time	Activity and Description
10 minutes	**Preparation Time** You have 10 minutes to prepare your stalls. Your stall should have the following: - Your crops with price tags, - A model of an irrigation tool with a price tag, and - Elements to attract the customers to your stall. Make sure you water the plants before putting them up for sale.
20 minutes	**Farmer's Market** ***Note:*** - *Invite parents/guardians and community members of the learners to visit the farmer's market. Instruct the learners to use the promotional material they created to invite them.* - *Collect the currency notes from the learners and hand over $ 10 to those who enter the market so that they can use the fake currency to buy products from the market.* - *Encourage learners to take feedback from the audience on the parts that are done well and the parts that can be improved.*
10 minutes	**Reflection Time** This is your time to think about what we have done in the past few days. Use the following questions as a guide for your answers: - What are two new things you learned about growing plants? - What did you find the most interesting part of the project? - What was most challenging/difficult for you? Why? - Do you think you were successful as a farmer? Did you earn a profit by selling your products? - How do you think you can improve the experience of your customers in the farmer's market?

	- Did you face any difficulties in transactions using money? How can you address those challenges? ***Tips:*** *Depending on the level of your learners, you can choose to get them to reflect on the first three questions or all the questions.* *The purpose of this activity is to encourage learners to think about how they learn. Sharing answers in English is not necessary. If your learners are comfortable with the local language, encourage them to use it while thinking about their answers to these questions.*

Additional enrichment activities:	**Water Conservation Campaign:** Research the different irrigation methods used for growing plants around the world. Find out which methods help conserve water. Design a water conservation campaign for your community promoting methods of watering plants that help conserve water. You can design posters, infographics, or educational videos to communicate the message of water conservation in your community.
Modifications for simplification	If your learners are unable to write, encourage them to draw pictures to show their ideas, and communicate verbally.

ASSESSMENT CRITERIA

A majority of my learners were able to:
☐ Practise direct sowing or transplantation to plant sprouted seeds.
☐ Design and create a model of an irrigation tool that can be used to water potted plants or a small garden and is made using materials available easily in the learner's surroundings.
☐ List the steps involved in cultivating their own crop.
☐Set up their stall in the farmer's market with a potted plant and an irrigation tool to sell.
☐ Create a sales pitch and use it to sell their products.
☐ Calculate profit or loss based on the sale of products in the farmer's market.