Wonder Project

Plant Challenge

Module 3: Flourish

It's time to think like an engineer to make those microgreens flourish. Students will use the '4 Ds' of Design Thinking – Discover, Design, Develop and Deliver to create and maintain the optimum growing environment. They'll also plant their second trial.

Use this overview as a reference as you go through Module 3 in the student Learning Hub with your class.

Week 3: 2-3 hours

Activity sequence

Unearthing the 4Ds

- Video: Discover

Lab 3.1: Build your grow house

Lab 3.2: Microgreen trial two

Lab 3.3: Making nutrients

Module outcomes

- Explore the 4 Ds of Design Thinking
- Think like an engineer to unleash the potential of your plants
- Build your first grow house
- Plant your second microgreen trial
- Start brewing your nutrient solution

Resources

From your plant kit:

- Lab book (1 per rōpū of 4)
- Poster: The 4 Ds

Lab 3.2: Microgreen trial two resources

- 5 x seed packets (1–2 teaspoons of seeds per rōpū of 4)
- Hemp grow mat (1 per rōpū of 4)
- Spray bottle (1 per rōpū of 4)
- Funnel (1 per rōpū of 4)

Daily data resources

- Sensor kit

School to supply:

Lab 3.1: Build your grow house resources

- Plastic container with lid (1 per rōpū of 4)
- Large clear plastic bags/sheets

Lab 3.2: Microgreen trial two resources

- Container with lid (1 per rōpū of 4)

Lab 3.3: Making nutrients resources

- Ingredients to make compost tea. We suggest things like banana skins, green tea, epsom salt, or baking soda
- Bowl, large bottle (i.e. milk bottle with the top cut off), or spare ice cream containers
- Classroom resources including scissors, pens, hot glue gun

Activity overview	What students will do	Teacher role	Ambassador role
Unearthing the 4Ds Introduces students to an engineering mindset and the 4 Ds of Design Thinking that they will use to maintain a successful and controlled growing environment for their microgreen trials and create their farm of the future.	Become familiar with the 4 Ds of Design Thinking.	Use the poster to prompt discussion on the 4Ds of Design Thinking. **Ask**: *What is important about the Discover/ Design/Develop/Deliver stage? Why is it helpful to go back and forth between each stage?*	Support discussion by giving real life examples of when you have seen or used this process (or similar) in your work. For example, the Engineering Design Process. Bring in examples to share.
Video: Discover Highlights some real-world examples of farms of the future using STEM to create controlled growing environments in wacky locations.	Discover that you can grow food sustainably, wherever and whenever you want by using innovative STEM solutions to create controlled growing environments. Watch video and get inspired for their farm of the future. Write notes.	Watch the video with students. After the video: **Ask**: *What do you think a controlled growing environment is? Why do you think this is important?*	After the video, outline how STEM thinking was used in the future farm examples. For example, engineering a growing environment to produce more crops in a confined space – vertical farming. Or, using technology and science to set up a controlled growing environment with special lighting, water, and heat systems.
Lab 3.1: Build your grow house Build on insights from the 'discover' video by making their first grow house to create a controlled growing environment for microgreen trial one.	Carefully read the instructions in their lab book. Then, build their grow houses in their rōpū of four and transfer their first batch of microgreens into a new home.	Help rōpū to build their grow houses. Encourage rōpū to think about the benefit of moving their first microgreen trial into a grow house.	Inspire students and discuss a time when you have used creativity and problem solving at work. Share examples or stories of when things go wrong. Discuss the benefits of setting up a controlled environment for greens and how real-life grow houses work.
Lab 3.2 Microgreen trial two Plant a second microgreen trial that will be used to test enhanced growing methods.	Pick their microgreen seed variety. Make small changes to seed planting method (e.g. sowing more/less seeds, soaking them for a longer period) and start thinking about other ways to improve the second trial. *Refer to Lab 2.1 to sow their second batch of seeds.* Name and label trays with date.	Help distribute the seeds and grow mat. Support the rōpū to plant and improve their second trial according to the tips in Lab 3.2 and instructions in Lab 2.1. *Refer to teacher support notes and 'from seed to harvest' poster for more detailed instructions on how to improve microgreen growth.* Remind them to continue to mist their trays every day and on a Friday afternoon.	Help distribute the seeds and grow mat to each rōpū. Circulate the rōpū and support them to plant their second trial. Encourage students to think about three things that went well in the first trial and three things to change in the next trial. **Ask**: *How well did the seeds grow? Were conditions too dry or too wet? Were the seeds overcrowded? Did they have enough light?*

Activity overview

Lab 3.3: Making nutrients

Learn about the benefits of adding nutrients to hydroponic growing systems.

What students will do

Create a nutrient solution made with their chosen ingredients, and water. Name and label solution with date.

Leave it to brew for a week.

Understand the benefits of adding nutrients to hydroponically grown plants..

Teacher role

Help students to make their nutrient solution.

Get each rōpū to present to the class what ingredient(s) they've chosen and why.

Ambassador role

Circulate rōpū and help students to make their nutrient solution.

Discuss why you need to add nutrients to plants when they're grown hydroponically.

Remember: Bring in recyclable materials for your second grow house and something to strain your nutrient solution!