### Stage 4

This project focuses on educating students on the power of managing organic waste inside of a school context. From practical science experiments demonstrating decomposition and investigations into compost systems, to safety hygiene regarding waste and school context analysis, students will thoroughly investigate the intricate design process of Managing Waste in a School efficiently.

#### Summative Assessment:

- A student demonstrates a strong understanding of appropriate biowaste-specific management by creating a compost system that positively effects the impact humans have on the natural world.

- Soft skills of project planning and design, communication and evaluation are demonstrated as the student presents their final composting design.

#### Outcomes and Links to Syllabus:

* **iSTEM (Project Based Learning):** ST5-1, ST5-2, ST5-3
* **Tech Mandatory (Stage 4 – Food Tech):** TE4- SDP-01, TE4-PDP-01, TE4-PPM-01, TE4-DES-01, TE4-SAF-01
* **Food Tech (Stage 5):** FT5-10, FT5-11, FT5-12, FT5-13
* **Science:** SC4-WS-07, SC5-WS-07, SC5-ENV-01
* **Geography:** GE4-MAN-01, GE5-MAN-01

#### Composting and Organic Waste – Lesson Sequence:

|  |  |  |
| --- | --- | --- |
| Lesson 1: Introduction to the science behind composting and organic waste and a mini-experiment | | |
| **OUTCOMES AND CONTENT:** | **TEACHING AND LEARNING ACTIVITIES:** | **RESOURCES:** |
| **Inquiry Question:**  How can Organic Waste be better utilised? | **1. Introduce students to the concept of composting, what it is and why it matters.**  *Sample video and outline details.* | [*Short video*](https://youtu.be/vA5DMcEwQFE) *(3min) explaining Composting.* |
| **Learning Intentions:**  **To be able to…**   * Learn what composting is and how it has a role in organic waste management. * Explain what decomposition is. * Setup a small, compost exemplar. | **2. Delve into the science of composting, explaining the decomposition process, and the roles of microorganisms, carbon, and nitrogen.**  *Teacher can simulate decomposition using chalk, water, vinegar and hydrogen peroxide (store bought concentrate is fine to use –* [*Chem Safety Link*](https://ecmjsp.education.nsw.gov.au/ecmjsp/chemicals/?mode=viewchemares&chemalpha=H&chemid=871#skipToContent)*).*  *Test the decomposition of chalk in different solutions and temperature to demonstrate that decomposition can be effected by many different factors (heat, pH levels, substances and chemicals).* | *Sample powerpoint can be found online* [***here***](https://cdn.vanderbilt.edu/vu-studentorg/wp-content/uploads/sites/25/2016/01/14203435/Chalk-Rates-of-Reaction.ppt)***.*** |
| **Success Criteria:**  **Now we can…**   * Explain how composting can manage organic waste. * Explain how decomposition occurs for all waste differently. * Create a small composting system. | **3. Students set up a small composting experiment in a classroom using plastic bins or jars, layering green and brown materials.**  *Class makes simple compost bin to set the scene for composting. Assign student groups to collect each resources / roles for each of the steps. Use short  life items and POSSIBLY ones included in the timeline suitcase example.* | *Link* [***here***](https://www.younghouselove.com/younghouselovedotcompost/) *for making one* |

|  |  |  |
| --- | --- | --- |
| Lesson 2: Benefits of composting and different ways to do it | | |
| **OUTCOMES AND CONTENT:** | **TEACHING AND LEARNING ACTIVITIES:** | **RESOURCES:** |
| **Inquiry Question:**  How can Composting be an Environmental game changer? | **1. Use laptops for students to research the environmental benefits of composting, such as reducing landfill waste, improving soil quality, and lowering emissions.**  *Research, Select and Advertise an existing product and why it is a good idea. Small presentations (*[*CANVA*](https://www.canva.com/)*).* | [*Cleanaway Infographic example*](https://schoolsnsw.sharepoint.com/:i:/r/sites/CentralCoastSTEMAcademyofExcellence-CCASE-SPO/Shared%20Documents/SPO/Dillon/Waste%20Management%20Program/Cleanaway%20FOGO%20Infographic.png?csf=1&web=1&e=BgKzXT) |
| **Learning Intentions:**  **To be able to…**   * Identify the benefits of composting. * Estimate how long items could take to breakdown.       **Success Criteria:**  **Now we can…**   * Explain how composting has man benefits. * Identify how long some items (plastics, organic matter) can take to decompose. | **2. Timeline of items (including biomaterials) breaking down. Procedural process of breakdown.**  *Students create a class timeline of items breaking down, “suitcase” example –*  *Or using butcher paper and laminated sheets for the timeline itself, students indicate the time taken for various materials to decompose.*      **3. Introduce students to various composting systems, including traditional bins, worm farms, and bokashi bins and their benefits (can also include non-composting breakdown).**  *Introduction and identifications of composting systems, PMI graphs.* | *Item breakdown table* [*PDF example*](https://schoolsnsw.sharepoint.com/sites/CentralCoastSTEMAcademyofExcellence-CCASE-SPO/Shared%20Documents/SPO/Dillon/Waste%20Management%20Program/Material%20Breakdown%20Rates%20-%20So%20Much%20Stuff.pdf?CT=1731028249499&OR=ItemsView&wdOrigin=TEAMSFILE.FILEBROWSER.DOCUMENTLIBRARY)*.*  *Butchers paper + markers.*        [*Webpage*](https://lomi.com/blogs/news/types-of-compost-bins?srsltid=AfmBOopQrFJktWyvKflNndse0i7ypkJ8kzhkY6ekMZcJeuAWCSN-nOr-) *on example composters.* |
|  |  |  |

|  |  |  |
| --- | --- | --- |
| Lesson 3: Identify waste, what can / can’t be composted and creating suggestions to process/manage/store all waste | | |
| **OUTCOMES AND CONTENT:** | **TEACHING AND LEARNING ACTIVITIES:** | **RESOURCES:** |
| **Inquiry Question:**  Does recycling and composting differ?    **Learning Intentions:**  **To be able to…**   * Identify what recycling is. * Identify what composting is. * List some challenges when storing waste.       **Success Criteria:**  **Now we can…**   * Contrast the difference between recycling and composting. | 1. **Recycling of materials, plastics and compostable bio-waste.**   *What materials are recyclable?*  *What materials cannot be recycled?*  *What do bio-materials fall under? (lead into composition, could be related as recycling for bio products).*       1. **Organizing and Categorizing waste.**   *Typical organisation could be; Organic, Plastic, Glass, Paper, Metal or other.*  *Begin game “Sorting Challenge” – each table group creates the above 6 paper bins (origami link attached) and is tasked with sorting out a range of items into the correct tubs (use pictures of real items).*       1. **Storing Wastes and Hazards.**   *Identify some of the problems with waste and the need for storage.*  *Outline some of the vast constraints surrounding waste storage.*  ***Activity****: Students are to create a sign that would be acceptable to use within a waste storage facility. They should be able to explain; the shape, colours, details, what it is helping / avoiding, where it would be used, etc…* | [*Video*](https://youtu.be/s4LZwCDaoQM?si=M_qckV0zDt10-DBF)*: What happens to your recycling after its collected?*      [*Origami boxes*](https://www.instructables.com/Classic-Origami-Box/) *and pictures of different materials printed and cut.*            *Creative equipment for signage creation.* |

|  |  |  |
| --- | --- | --- |
| Lesson 4: Safety hygiene in composting | | |
| **OUTCOMES AND CONTENT:** | **TEACHING AND LEARNING ACTIVITIES:** | **RESOURCES:** |
| **Inquiry Question:**  How can we be safe around composting?      **Learning Intentions:**  **To be able to…**   * Identify hazardous tasks and required PPE. * Recognise that not all reactions are the same.     **Success Criteria:**  **Now we can…**   * Determine the PPE required for various   hazardous tasks. * Identify potential catalysts in different processes. | **1.  Introduce the importance of hygiene and safety practices when handling compost and organic waste.**  ***SPRINT Activity****:*  *School observation walk – teacher led walk around the school facilitating student discussion regarding appropriate PPE needed for particular practices (PPE needed for cleaning bathrooms, emptying bins, wiping handles, picking up rubbish). Students document the practice/action done and PPE needed.*      **2. Timeframe / sped up reactions science and enzymes.– Link to TAS safety existing ideas.**  *Science experiment – “A Rusty Nail” testing the rusting process of a nail in various mediums as a way to demonstrate how reactions can be sped up.*  *Tap water, Salty Water, Lemon Juice, Coke* | *Books / paper, clipboards.*  *Potential PPE to demonstrate with (gloves, mask, glasses, “grabber reacher”.*      *A rusty nail exemplar* [*Science Investigation*](https://www.fizzicseducation.com.au/150-science-experiments/kitchen-chemistry-experiments/rusty-nail-experiment/?srsltid=AfmBOoqSWNQxLVBiL1-TAZU0nWPhxT3nxp5lGKdaN7_HD_wAums3sKPs)              *Potential Excursion –* [*Somersby ARC Ento*](https://www.arcentotechltd.com.au/) *“Soldier Flies”.* |

|  |  |  |
| --- | --- | --- |
| Lesson 5: Analysing mini compost experiment | | |
| **OUTCOMES AND CONTENT:** | **TEACHING AND LEARNING ACTIVITIES:** | **RESOURCES:** |
| **Inquiry Question:**  How can we apply our knowledge in real life context?      **Learning Intentions:**  **To be able to…**   * Use our knowledge to plan for and create a composting system.       **Success Criteria:**  **Now we can…**   * Design and create a small composting system. | **1. Students set up a small composting experiment in a classroom using plastic bins or jars, layering green and brown materials.**  *SPRINT Activity: Students are creating a mini composting system in small groups using either small plastic tubs or jars.* | *Example method and material list can be found* [*here*](https://www.younghouselove.com/younghouselovedotcompost/)*.*  *Change to suit your context.* |
|  |  |  |

### Suggestions to continue after the sequence

#### Project planning, analysing and assigning roles

Finalize experiment with results and discuss a school version. Discuss plan and potential roles such as collectors, monitors, compost turners, and record keepers.

***SPRINT Activity****: Students are modifying / finishing their mini composting system in either small plastic tubs or jars, and collecting results such as temperature, moisture and designing how their prototype could be potentially up-scaled for a whole school initiative.*

#### Creating a composting initiative prototype

Prepare for school-wide project by creating potential prototype presentation.

***SPRINT Activity****: Presentation on HOW students would* ***1)*** *Upscale their design and then* ***2)*** *implement into the school. Deliver their presentation.*

#### Setting up a composting plan for the school

Facilitate student planning of a school-wide composting project by guiding groups using the [Design Process](https://iteachstem.com.au/wp-content/uploads/2020/08/istem_process_poster_early_8_cogs.pdf).

***- STEM Design Process Lesson, no SPRINT*** *-  small group project planning.*

#### Creating a composting waste collection system

Continue to plan group project – Explicitly discuss the challenges and logistics of collecting organic waste for composting as a class. Include challenges such as setting up, designated collection bins, upskilling students and potential pickup schedule (include points in students **“Identify”** Step).

***- STEM Design Process Lesson, no SPRINT*** *-  small group project planning.*

#### References

This resource contains NSW Curriculum and syllabus content. The NSW Curriculum is developed by the NSW Education Standards Authority. This content is prepared by NESA for and on behalf of the Crown in right of the State of New South Wales. The material is protected by Crown copyright.

Please refer to the NESA Copyright Disclaimer for more information. <https://educationstandards.nsw.edu.au/wps/portal/nesa/mini-footer/copyright>

NESA holds the only official and up-to-date versions of the NSW Curriculum and syllabus documents. Please visit the NSW Education Standards Authority (NESA) website <https://educationstandards.nsw.edu.au/wps/portal/nesa/home> and the NSW Curriculum website [https://curriculum.nsw.edu.au](https://curriculum.nsw.edu.au/).

#### Links to third-party material and websites

Please note that the provided (reading/viewing material/list/links/texts) are a suggestion only and implies no endorsement, by the New South Wales Department of Education, of any author, publisher, or book title. School principals and teachers are best placed to assess the suitability of resources that would complement the curriculum and reflect the needs and interests of their students.

If you use the links provided in this document to access a third-party's website, you acknowledge that the terms of use, including licence terms set out on the third-party's website apply to the use which may be made of the materials on that third-party website or where permitted by the *Copyright Act 1968* (Cth). The department accepts no responsibility for content on third-party websites.

© State of New South Wales (Department of Education), 2023

The copyright material published in this resource is subject to the *Copyright Act 1968* (Cth) and is owned by the NSW Department of Education or, where indicated, by a party other than the NSW Department of Education (third-party material).

Copyright material available in this resource and owned by the NSW Department of Education is licensed under a [Creative Commons Attribution 4.0 International (CC BY 4.0) license](https://creativecommons.org/licenses/by/4.0/)

A grey and black sign with a person in a circle

Description automatically generated

This license allows you to share and adapt the material for any purpose, even commercially.

Attribution should be given to © State of New South Wales (Department of Education), 2023.

Material in this resource not available under a Creative Commons license:

* the NSW Department of Education logo, other logos and trademark-protected material
* material owned by a third party that has been reproduced with permission. You will need to obtain permission from the third party to reuse its material.

*These materials have been developed by NSW Education proudly funded by the NSW Government through the NSW EPA’s Business Food Waste Partnership Grants.*