



Composting and worm farming

Teacher Guide

Introduction:

Zero Waste Education (ZWE) is a waste minimization education programme which teaches children about sustainable resource use through reducing, reusing, recycling and composting. Established in 1993 ZWE is taught in over 500 schools throughout New Zealand.

This Council funded programme enables children to investigate the link between Earth's natural resources, the products they use and see around them and the resulting waste that pollutes our environment. It empowers them to make decisions to reduce the waste pile by reducing, reusing, recycling and composting and by sharing their knowledge with others.

The programme consists of eight units each focusing on a specific solution to our waste problem. The units alternate each year so students receive new material while building on what they have previously learned. By the time students leave Year 8 they will have received all eight units.

- Years 1 and 2: Is That Rubbish? and The Litterless Lunchbox
- Years 3 and 4: Reduce Unit and Reusing Unit
- Years 5 and 6: Recycling Unit and Composting and worm farming Unit
- Years 7 and 8: Resource Sustainability Unit and Water Unit
- Years 5 to 8: Rural Recycling Unit

Teacher Guide Overview

This guide is provided to assist teachers in undertaking curriculum planning for learning in class. Included in all ZWE teacher guides are suggested hands-on extension activities. The guide promotes the inquiry learning process using the ZWE *Four R's of Inquiry*. A more detailed version of the inquiry model follows.



The ZWE visit takes place during the 'Research' stage of the inquiry process. During this time students will be immersed in the topic of 'Reducing the Waste Pile' and will cover selected achievement objectives from the New Zealand Curriculum. The aim is for students to build up a knowledge bank and become experts in the topic.

Post ZWE, students are given an opportunity to 'Regroup' as a class and consider the current waste related issues in their school, home or wider community. Students are then able to 'Respond' to a specific issue they are passionate about as group or independently. To 'Reflect' is an important part of the inquiry process and students should be given a chance to review and share what they have learnt and the actions they have taken.

Timetabling

This unit consist of four 45-minute lessons. Teachers can opt for one 45-minute session over four days, or two 90-minute sessions. All lessons are taught by specialist educator.

Teacher Obligations

We ask that teachers remain in their classroom for the duration of all lessons.

Workbooks

Each student receives their own workbook to complete during the ZWE lessons. At the end of the unit, students are encouraged to take their books home to share their learning with their whānau. A marking template is provided for the classroom teacher and gives answers in the student workbooks.

Composting and worm farming unit

Composting and worm farming are an important part of reducing our growing waste problems. In this unit student's will investigate the role of nature in turning organic waste into compost. The key composting elements of nitrogen and carbon are examined, as are the differences between landfills and composts. There is an option for students to build their own mini-composts (complete with worms) providing them with the knowledge and skills to build and maintain larger compost piles.

After the ZWE visit teachers are encouraged to continue the learning through an inquiry learning process.



Ensure sustainable consumption and production patterns

12.2. By 2030, achieve the sustainable management and efficient use of natural resources. In the Composting and worm farming unit, students learn how the organic waste is turned into products.

12.5. By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse. Zero Waste Education programme aims to educate students in waste minimisation by reduce, reuse and recycle.

Optional activity

Students will be asked to bring a 2-litre plastic bottle or ice cream containers and some organic wastes to make their mini worm farm bins.

Literacy Integration

Instructional Writing: How to build a mini-compost, step-by-step.

Persuasive Writing: Every home and school should have a compost pile for organic waste.

Report Writing: Write about tiger worms, their special features, where they live, etc.

Visual Language: Design a brochure promoting and explaining composting, the benefits, what can and can't be composted, how to compost etc.

Curriculum Planner

Zero Waste – Composting			
Values: Community & participation. Ecological sustainability.	Key Competencies: Using language, symbols, texts. Participating & contributing.	Principles: Future Focus – sustainability.	Learning Areas: Social Sciences Health and PE Technology Science
Possible Achievement Objectives: Social Science (Level 2) Students will gain knowledge, skills and experience to: - Understand that people have social, cultural and economic roles, rights and responsibilities. - Understand how places influence people and people influence places. - Understand how people make choices to meet their needs and wants. Social Science (Level 3) Students will gain knowledge, skills and experience to: - Understand how people make decisions about access to and use of resources. Social Science (Level 3) Students will gain knowledge, skills and experience to: - Understand how producers and consumers exercise their rights / meet their responsibilities. - Understand how people participate individually and collectively to community challenges.			
Science (Level 2) Living World, Ecology - Recognize that living things are suited to their habitat. Material World, Properties and Changes of Matter - Observe, describe and compare physical and chemical properties of common materials and changes that occur when materials are mixed, heated or cooled. Science (Level 3) Living World, Ecology - Explain how living things are suited to their habitat and how they respond to environmental changes, natural and human-induced. Material World, Properties and Changes of Matter - Group materials in different ways, based on observations and measurements of the characteristic chemical and physical properties of a range of different materials. (e.g. organic waste as carbon and nitrogen.			
Technology (Level 3) Technological Practice: Planning for practice Undertake planning to identify the key stages and resources required to develop and outcome. Revisit planning to include reviews of progress and identify implications for subsequent decision making.			

Suggested Inquiry Process

Inquiry stage: Research	
Pre-visit: Check in: what do we already know about Zero Waste? <i>Think, Pair, Share (class brainstorm)</i>. Explore concepts: <i>natural resources, products, waste</i>. What are these and where can we find them?	
During visit: Most of the <i>research</i> stage takes place during the ZWE visit with the educator. The learning intentions and assessment tasks in this stage are based around the ZWE lessons, activities, workbook and marking template. Each assessment task below relates to a workbook activity (see ZWE marking template for more information).	
Learning Intentions: Students will be able to explain the difference between how waste behaves in a compost bin and landfill. Students will be able to identify what can and cannot be composted. Students will show how to correctly layer a compost pile. Students will understand the role of compost and how it is used. Students will build their own compost bin that is correctly layered.	Workbook Assessment Activities: A:1) Students draw diagrams showing how compost uses air, heat and rain to breakdown compared with landfill that does not have access to these and breaks down differently. A:2) Students separate organic waste into carbon and nitrogen material and determine items that can't be composted. A:3) Students write a compost recipe with carbon and nitrogen material layered correctly. A:4) Students draw a diagram showing where they could feed a tree with compost. A:5) Students plan, source and build a mini-compost with the appropriate materials.

Inquiry stage: Regroup	
Learning Intention: Examine the current situation concerning waste in the school or wider community.	Focusing Ideas, Questions: - What are the issues? - How might they affect us now or in the future? - Why are they happening? - How do we feel about these issues? - Has our new knowledge changed the way we feel?
Extension Activities: - Create a class knowledge bank based on previous and new knowledge. - Think, Pair, Share / Brainstorm using visual mind-mapping - Discuss the issues using De Bono's Six Thinking Hats.	

Inquiry stage: Respond

Learning Intention:

Respond to an issue concerning waste in the school or wider community.

Record findings / Improvements

Focusing Ideas, Questions:

- Which issue do we want to respond to?
- Can something be done?
- What could/would happen if...?
- How might we make others aware?
- How can our knowledge and ideas help others?
- How can we influence decisions made by others?
- Who is going to do what? *Who decides?*

Record findings / improvements:

- What sort of information should we show?
- How will we collect it?
- How will we sort and present the information?
- Who is going to do what? *Who decides*

Extension Activities:

- Start a class compost or worm farm using the mini-compost bins. First conduct a statistical investigation to find out how much organic waste your class/school produces each day. This will provide information which can be later compared and will help determine what size compost or worm bin is needed. If your school already has a system for collecting organic waste do an audit and check how well the system is working.

- Audit the class and staff room bins, you could even audit the skip bin? You will need a tarpaulin, some reusable thick gloves (dishwashing gloves are good), choose categories and separate waste from bins into categories. For example, organic, paper, cardboard, recyclable containers (aluminum cans, steel cans, glass bottles and jars and plastics that are recyclable in your area). Once completed record findings and determine improvements that could be made.

Inquiry stage: Reflect

Learning Intention:

Share the learning journey with others, using a variety of ways to convey information.

Focusing Ideas, Questions:

- How has the issue changed?
- What is different? *Is anything different?*
- What evidence do we have to show this?
- Have your feelings changed about the issue?
- What could we do better next time?
- What is left to do?

Extension Activities:

- Revisit the class knowledge bank, add to it with new knowledge.
- Explore ways of presenting information and share findings with as many people as possible.

Additional Resources

Title	Author	Series	Curriculum level	Reading year level	Publication date	Link
	Simon Cooke	School Journal I	2	4	October 2015	https://instructionalseries.tki.org.nz/Instructional-Series/School-Journal/School-Journal-Level-2-October-2015/A-Work-of-Art
	Deanna Ferguson	School Journal I	2	4	November 2018	https://instructionalseries.tki.org.nz/Instructional-Series/School-Journal/School-Journal-Level-2-November-2018/The-Plastic-free-Challenge
	Kate Potter	Connected		4	January 2013	https://instructionalseries.tki.org.nz/Instructional-Series/Connected/Connected-2013-level-4-Are-You-Sure/Accidental-Plastics
	Sophie Fern	Non-fiction	2	4	January 2014	https://instructionalseries.tki.org.nz/Instructional-Series/Connected/Connected-2014-level-2-How-Do-You-Know/Garden-with-Science

Recycling in New Zealand

<http://recycle.co.nz/>

Create your own Eden: composting and worm farm website

<http://www.createyourownden.org.nz/>

EERST – Paper4 Trees

www.paper4trees.co.nz

Love Food Hate Waste

<https://lovefoodhatewaste.co.nz/>

More resources:

<https://zerowasteeducation.co.nz/educationunits/resources-and-further-information/>