ZERO WASTE Education

"Educating Today for a Sustainable Tomorrow"

Water

Teacher Guide

Introduction:

Zero Waste Education (ZWE) is an award winning 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 Unit
- Years 7and 8: Resource Sustainability Unit and Water 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 student's 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 four 45-minute sessions over four days, or two 90-minute sessions (with a 10-minute break mid-session). 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. The workbook also includes formative assessment tasks which are completed under the guidance of the educator. Each formative assessment task focuses on the key learning intentions for the lesson and can also be used by the classroom teacher.

Marking Template

A marking template is provided for the classroom teacher and gives answers to the assessment tasks in the student workbooks.

Water Unit

Water is one of the most precious natural resources on our planet. In this unit students investigate how water circulates through the water cycle, how we use water and what happens to the water we no longer want – waste water and storm water. Our role in water conservation and water pollution are also explored.

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

Homework

The homework task for this unit is designed to be a fun way for students to share their learning and explore water conservation at home with their families.

Literacy Integration

A list of relevant journal and 'connected' articles is provided at the end of this document. Some suggested ways for integrating this unit into your literacy programme follow.

Persuasive Writing: to conserve water everyone should only take 3 minute showers. *This could make a good debate topic also.*

Report Writing: write a report about storm water drains, why they are needed, where storm water ends up and the effect waste in the storm water has on the ecosystems (streams, rivers, the ocean).

Visual Language: Design a poster showing the water cycle, describing how water is used by people, showing ways to conserve water, showing how to avoid storm water pollution.

Curriculum Planner

<table>
<tr><td colspan="4">Zero Waste – Composting</td></tr>
<tr><td>Values:
Community & participation.
Ecological sustainability.</td><td>Key Competencies:
Using language, symbols, texts.
Participating & contributing.</td><td>Principles:
Future Focus – sustainability.</td><td>Learning Areas:
Social Sciences
Health and PE
Technology</td></tr>
<tr><td colspan="4">Possible Achievement Objectives:
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 4)
Students will gain knowledge, skills and experience to:
• Understand that events have causes and effects.
• Understand how people participate individually and collectively in response to community challenges</td></tr>
<tr><td colspan="4">Science (Level 3 & 4)
Planet Earth and Beyond: Earth systems
• Appreciate that water, air, rocks and soil, and life forms make up our planet and recognise that these are also Earth's resources.
Interacting systems
• Investigate the water cycle and its effect on climate, landforms and life.
Nature of Science: Participating and contributing
• Use their growing science knowledge when considering issues of concern to them.
• Explore various aspects of an issue and make decisions about possible actions.</td></tr>
<tr><td colspan="4">Health & Physical Education (Level 4)
Healthy communities and Environments – Community Resources
• Investigate and/or access a range of community resources that support well-being and evaluate the contribution made by each to the well-being of community members.
Rights, responsibilities, and laws; People and the environment
• Specify individual responsibilities and take collective action for the care and safety of other people in their school and in the wider community.</td></tr>
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Suggested Inquiry Process

Inquiry stage: Research
Pre-visit: Check in: what do we already know about Zero Waste? *Think, Pair, Share (class brainstorm)*. Explore concepts: *natural resources, products, waste.* What are these and where can we find them?
During visit: Most of the *research* 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 understand the water cycle process. Students will understand the difference between wastewater and stormwater. Students will learn how and why we treat wastewater. Students will be able to identify ways that humans pollute stormwater. Students will demonstrate how to conserve water around the home.

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?
Possible 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:	Focusing Ideas, Questions:
Respond to an issue concerning waste in the school or wider community.	- 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	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* - Is there a digital format we could use?

Possible Responses:

- Design a stencil to be sprayed on the concrete next to the school drains. This stencil should educate the students in your school about stormwater pollution.

- Devise community education actions regarding water conservation – How will you engage people and get the word out?

- Storm water pollution experiment: you'll need a bucket, ice cream container and a scrubbing brush. Fill the bucket with water and take it out into the driveway. Slowly tip water onto the driveway so it runs in the gutter. Scrub the wet area and catch the water from the gutter into the ice cream container. Look at the water in the container, what does it look like? What colour is it? What do you think is in it? Could this be harmful if it flowed down the drain into the water?

- If rural – field survey of property and evaluate what is polluting run off. Devise solutions to try and measure outcomes.

- Water Wardens: in small groups student's patrol the school and check for water leaks. Determine areas of the school to check e.g. classrooms, toilets, outdoor taps and staffroom. In groups conduct an inspection for water leaks (toilets or taps leaking), report back to class and determine how these could be remedied. Speak to the caretaker, help to fix leaks.

- Field survey – where is trash accumulating that will flow to the sea in your school's area? Devise a community education action.

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?
Possible 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	Type	Level	Edition	Year
Power Alternatives 	MEYER, Anna DICKSON, Andrew	Article	Year 5-8	Connected No.3	2010
This article introduces and explains four alternative sources of energy to wind power - solar, tidal, nuclear, and hydroelectric power.					

Title	Author	Type	Level / Year	Edition	Year
Encounter with nature 	DAVY, Lucy	Story	Year 7	Part 4. No.2	2007
Just another day at the beach - in the year 2107 - but nature as we know is largely destroyed. Story a winner of a school journal writing competition.					

Title	Author	Type	Level / Year	Edition	Year
After the spill 	GILL, Maria	Article	Year 7	Connected No. 4	2013
On 5 October 2011 the Rena struck the Astrolabe reef and its hull was breached. This article reports on what was done to contain the damage and what is still to be done.					

Title	Author	Type	Level / Year	Edition	Year
A plate of potatoes 	EVERTS, Ali	Article	Year 7	Connected No. 1	2003
Potatoes are wonderful vegetables. Among their many uses, they can be used to make rewena bread, potato chips, and plates. Plates? Yes! This article describes how starch from potatoes is now being used to make ecologically sound throwaway plates and fast-food containers.					

Title	Author	Type	Level / Year	Edition	Year
Mr. Trasks Trash 	BELCHER, Angie	Article	Year 7	Part 04, No.2	1998
When Mr. Trask visited Te Puke Intermediate School and said he wanted to talk rubbish, the students were surprised. It wasn't until he delivered his reuse, reduce, and recycle message that everyone understood exactly what he meant.					

Title	Author	Type	Level / Year	Edition	Year
Up the pipe:  	TERRY, Fiona	Article	Level 3	Nov	2014
Dr. Louis Tremblay and his team investigate the sludge at sewage treatment plants and go 'up the pipe' to find out what goes down household drains. They want to raise public awareness of the harmful chemicals we may be using every day and convince us to use products that are less harmful to our environment.					

Title	Author	Type	Level / Year	Edition	Year
The Water Cycle  	REA, William	Article	Year 4-6	Connected No.2	2002
Are we really aware of how powerful an effect water has on shaping the land? This article takes a New Zealand perspective as it looks at the water cycle, following weather and land forming processes as water moves from sea, to sky, to land, and back to sea.					

Title	Author	Type	Level / Year	Edition	Year
Water Worries  	McMillan, Rachel	Article	Year 6	Level 3. Apr	2012
A general article about water, with a specific focus on New Zealand, including access, pollution, and future supply.					

Title	Author	Type	Level / Year	Edition	Year
Wonderful Water 	WERRY, Philippa	Story	Year 5-8	Connected No.3	2004
Many local authorities run projects in which students take direct action in monitoring and protecting local ecosystems. This is an amusing story about one such programme in which a class investigates the water quality of two Wellington streams.					

Ecological Footprint Calculator:
http://www.wwf.org.au/get-involved/change-the-way-you-live/ecological-footprint-calculator

Sustainable Living Aotearoa
https://sustainableliving.org.nz/

Community Recyclers
http://communityrecyclers.org.nz/

Recycling in New Zealand
http://recycle.co.nz/

Water Conservation
http://www.smarterhomes.org.nz/water/

Local Council: Check out your local council's website for other education resources.