

# 2016年南島民族 科學與數學教育學術研討會

The 2016 Austronesians Conference on Science and Mathematics Education

## KEYNOTE SPEECH IV

### Keynote Speaker:

**Associate Professor Jenny Ritchie**

School of Education, Victoria University of Wellington, New Zealand

### Topic:

Facilitating Young Children's Science Explorations and Understandings via a Dual Onto-Epistemological Lens, One that Honours both Indigenous and Western Notions: A Perspective from Aotearoa New Zealand

## Handout 演講資料

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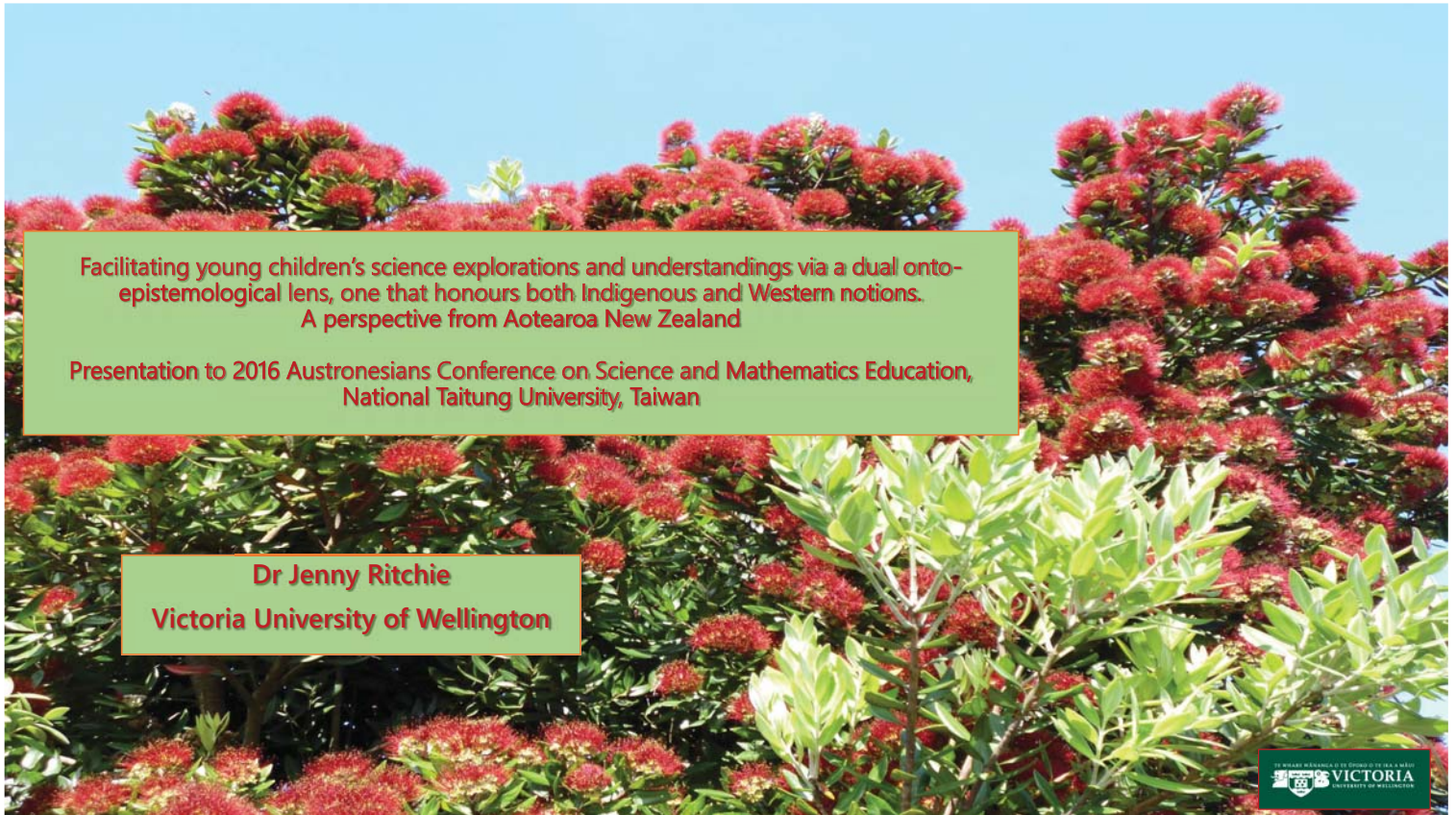
Department of  
Early Childhood Education



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Facilitating young children's science explorations and understandings via a dual onto-epistemological lens, one that honours both Indigenous and Western notions.  
A perspective from Aotearoa New Zealand

Presentation to 2016 Austronesians Conference on Science and Mathematics Education,  
National Taitung University, Taiwan

Dr Jenny Ritchie  
Victoria University of Wellington



## Overview

- Some background, contextual information
- Overview of *Te Whāriki*, the New Zealand early childhood curriculum
- Working theories, dispositions and exploration - science learning and teaching as conceptualised in *Te Whāriki*
- Some examples from a research project exploring cultural and ecological sustainability in ten early childhood education services in Aotearoa

# Connections

- In the past decade and a half, geneticists have confirmed what linguists and archaeologists had been saying since the 1970s - that there is a clear lineage running from Taiwan's inhabitants of 5000 years ago to modern-day Polynesians, including Māori
- Austronesians, began to make forays south from their home in Taiwan, spreading first to the nearby Batenes Islands, then to the Philippines and beyond
- About 3000 years ago, in what is now Papua New Guinea, the Austronesians encountered another major group, the Papuans, who are closely related to modern-day Australian Aboriginals. Inter-marriage between the groups, in a genetic mix of about 70 per cent Austronesian and 30 per cent Papuan, produced the ancestors of the modern Polynesians
- These proto-Polynesians, with their unique genetic mix, then sailed into the Pacific, settled it, and eventually arrived in New Zealand

Source: <http://www.stuff.co.nz/travel/destinations/asia/67390585/New-Zealand-long-lost-Taiwanese-cuzzies>

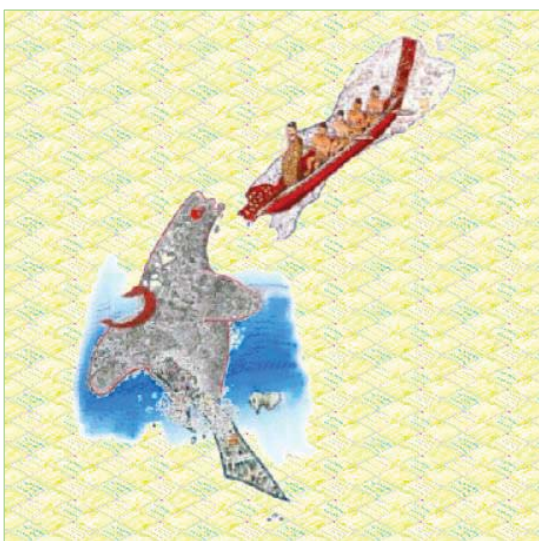
## New Zealand - Aotearoa

- 4.7 million people
- 15% of these are Māori, the indigenous people
- The Māori language is recognised as an official language but is not spoken widely, as due to colonisation English is the dominant national language
- 18% of Māori speak their own language, 0.63% of non-Māori speak Māori
- The 1840 Treaty of Waitangi which allowed for British settlement had offered protection of Māori lands, language, beliefs and customs, but was not upheld
- Since 1985 legislation has finally recognised the Treaty and New Zealand is moving towards addressing past injustices

# Māori narratives

- Māori cosmologies relate how the Earth Mother Papatūānuku and the Sky Father Ranginui were originally very tightly close together, until one of their children, Tāne Mahuta, managed to separate them in order to create life and space for all the children of the original parents
- Tāne Mahuta then created plants, creatures and the first woman, with whom he procreated producing humans. This genealogy locates people as closely related to the planet, plants, and animals
- A demi-god called Maui, is believed to have fished up the North island (Te Ika a Maui – Maui's fish) of New Zealand from his boat, which became the South Island (Te Wai Pounamu – the Land of Jade Waters)
- Māori arrived in Aotearoa by voyaging across the Pacific Ocean in large ocean-going vessels (waka). Archaeologists date Māori settlement of Aotearoa to 1200

## Different world views



Source: <http://www.top.net.nz/~hugh/ingoa/>



Source: [http://www.bugbog.com/maps/australasia/pacific\\_map.html](http://www.bugbog.com/maps/australasia/pacific_map.html)

# Examples of different worldviews

## Māori

Whānau, hapū, iwi

(family, sub-tribe, tribe)

Spiritual wellbeing is paramount

Collective wellbeing is paramount

Acknowledgement of the Earth Mother and Sky Father as fundamental to all life

## Western

Individualistic, nuclear family

Physical wellbeing is paramount

Individual achievement is paramount

Exploitation of the Earth is part of progress and profit-making

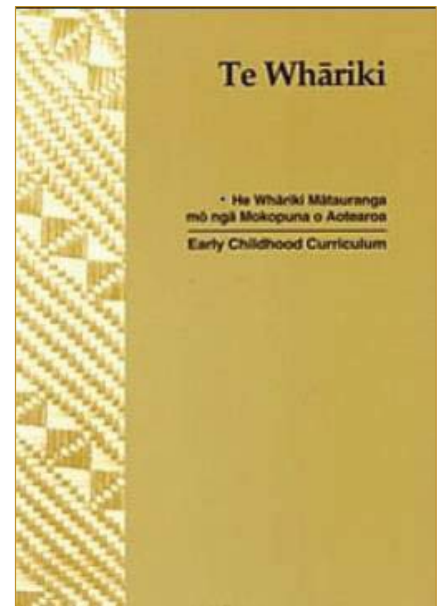
# Early childhood education in Aotearoa

- Children aged 0-5, high participation rates, a range of different services including early education and care, kindergarten, home-based, Playcentre, and kōhanga reo (Māori language and culture services)
- Only 50% of teachers in each setting are required to hold a degree level teaching qualification. Public kindergartens maintain fully qualified staffing
- Has had a strongly progressive history based in Frederick Fröbel's model, later influenced by ideas of John Dewey, Susan Isaacs, and Maria Montessori

# Te Whāriki – New Zealand Early Childhood Curriculum

Te Whāriki recognises the rights of Māori as the first people of the land, tangata whenua, to have their language and culture visible and affirmed in early childhood education settings:

‘In early childhood education settings, all children should be given the opportunity to develop knowledge and an understanding of the cultural heritages of both partners to Te Tiriti o Waitangi’ (New Zealand Ministry of Education, 1996, p. 9)



## Te Whāriki principles

### **1. Whakamana – Empowerment**

The early childhood curriculum empowers the child to learn and grow.

### **2. Kotahitanga – Holistic Development**

The early childhood curriculum reflects the holistic way children learn and grow.

### **3. Whānau Tangata – Family and Community**

The wider world of family and community is an integral part of the early childhood curriculum.

### **4. Ngā Hononga – Relationships**

Children learn through responsive and reciprocal relationships with people, places, and things.

# Empowerment for Māori

‘Particular care should be given to bicultural [Māori] issues in relation to empowerment.

Adults working with children should understand and be willing to discuss bicultural issues [Māori], actively seek Māori contributions to decision making, and ensure that Māori children develop a strong sense of self-worth’.

(Te Whāriki, page 40)



Source: <http://www.eit.ac.nz/2014/01/early-childhood-teaching-a-challenging-career/>

## Strands of Te Whāriki

### Strand 1: **Well-being – Mana Atua**

The health and well-being of the child are protected and nurtured.

### Strand 2: **Belonging – Mana Whenua**

Children and their families feel a sense of belonging.

### Strand 3: **Contribution – Mana Tangata**

Opportunities for learning are equitable, and each child’s contribution is valued.

### Strand 4: **Communication – Mana Reo**

The languages and symbols of their own and other cultures are promoted and protected.

### Strand 5: **Exploration – Mana Aotūroa**

The child learns through active exploration of the environment.

## Strand 1. Well-being – Mana Atua

The health and well-being of the child are protected and nurtured.

### Goals

Children experience an environment where

- their health is promoted;
- their emotional well-being is nurtured;
- and they are kept safe from harm.

## Strand 2. Belonging – Mana Whenua

Children and their families feel a sense of belonging.

### Goals

Children and their families experience an environment where:

- connecting links with the family and the wider world are affirmed and extended;
- they know that they have a place;
- they feel comfortable with the routines, customs, and regular events;
- and they know the limits and boundaries of acceptable behaviour.



## Strand 3: Contribution – Mana Tangata

Opportunities for learning are equitable, and each child's contribution is valued.

### Goals

Children experience an environment where:

- there are equitable opportunities for learning, irrespective of gender, ability, age, ethnicity, or background;
- they are affirmed as individuals;
- and they are encouraged to learn with and alongside others.

## Strand 4: Communication – Mana Reo

The languages and symbols of their own and other cultures are promoted and protected.

### Goals

Children experience an environment where:

- they develop non-verbal and verbal communication skills for a range of purposes;
- they experience the stories and symbols of their own and other cultures;
- and they discover and develop different ways to be creative and expressive.

# Strand 5: Exploration – Mana Aotūroa

The child learns through active exploration of the environment.

## Goals

Children experience an environment where:

- their play is valued as meaningful learning and the importance of spontaneous play is recognised;
- they gain confidence in and control of their bodies;
- they learn strategies for active exploration, thinking, and reasoning;
- and they develop working theories for making sense of the natural, social, physical, and material worlds.

## Working theories

‘In early childhood, children are developing more elaborate and useful working theories about themselves and about the people, places, and things in their lives.

These working theories contain a combination of knowledge about the world, skills and strategies, attitudes, and expectations.

Children develop working theories through observing, listening, doing, participating, discussing, and representing within the topics and activities provided in the programme’. (Te Whāriki, page 44)

## Te Whāriki and Working theories...

‘As children gain greater experience, knowledge, and skills, the theories they develop become more widely applicable and have more connecting links between them.

‘Working theories become increasingly useful for making sense of the world, for giving the child control over what happens, for problem solving, and for further learning.

‘Many of these theories retain a magical and creative quality, and for many communities, theories about the world are infused with a spiritual dimension’. (Te Whāriki, page 44)

## Te Whāriki and Learning Dispositions

‘The second way in which knowledge, skills, and attitudes combine is as dispositions – “habits of mind” or “patterns of learning”.

-An example of a learning disposition is the disposition to be curious.

‘To encourage robust dispositions to reason, investigate, and collaborate, children will be immersed in communities where people discuss rules, are fair, explore questions about how things work, and help each other.

-The children will see and participate in these activities’.

(Te Whāriki, page 44)

## Dispositions...

‘Dispositions to learn develop when children are immersed in an environment that is characterised by well-being and trust, belonging and purposeful activity, contributing and collaborating, communicating and representing, and exploring and guided participation.

Dispositions provide a framework for developing working theories and expertise about the range of topics, activities, and materials that children and adults in each early childhood service engage with’.

(Te Whāriki, page 45)

## Strand of Exploration

‘All aspects of the environment – the natural, social, physical, and material worlds – are part of the context of learning.

Implicit in the concept of the child as explorer is the importance of respect for the environment.

Children learn through play – by doing, by asking questions, by interacting with others, by setting up theories or ideas about how things work and trying them out, and by the purposeful use of resources.

They also learn by making links with their previous experiences’.

(Te Whāriki, page 82)

# Exploration...

'In early childhood education, as in later learning and development, exploration will be guided, supported, and challenged by adults and other children.

'There should be a recognition of Māori ways of knowing and making sense of the world and of respecting and appreciating the natural environment'.  
(Te Whāriki, page 82)



## Some Exploration Strand learning outcomes

Children will develop:

- 'there should be a recognition of Māori ways of knowing and making sense of the world and of respecting and appreciating the natural environment' (TW, page 82)
- 'the ability to enquire, research, explore, generate, and modify their own working theories about the natural, social, physical, and material worlds;
- working theories about Planet Earth [Papatūānuku] and beyond;
- a knowledge of features of the land which are of local significance, such as the local river or mountain;
- theories about social relationships and social concepts, such as friendship, authority, and social rules and understandings;
- a relationship with the natural environment and a knowledge of their own place in the environment;
- respect and a developing sense of responsibility for the well-being of both the living and the non-living environment
- working theories about the living world and knowledge of how to care for it...'  
(Te Whāriki, page 90)

## Research Project:

Titiro Whakamua, Hoki Whakamuri. We are the past, present and the future.

Caring for self, others and the environment in early years' education

-Ten early childhood care and education settings, both kindergarten and childcare centres

-Data was gathered between 2008-2009

-Funded by the New Zealand Teaching and Learning Research Initiative

-Co-directors: Jenny Ritchie, Cheryl Rau, Iris Duhn and Janita Craw

Available at:

<http://tlri.org.nz/tlri-research/research-completed/ece-sector/titiro-whakamuri-hoki-whakamua-we-are-future-present-and>

## Sustainability learning at Richard Hudson Kindergarten

Teachers initial list of what they were already doing:

### What We Already Do...

- √ Healthy Eating, Healthy Action (HEHA) Grant application to Health Board for \$1500 for proposed vegetable garden, fruit trees.
- √ Food recycling to animals
- √ Hens' eggs for cooking/baking
- √ Gardening with the children – watering, maintaining
- √ Seasons – awareness of cycle – as displayed so well by our kindergarten trees
- √ Books – favourites like Ten Seeds, Apple Tree, Pumpkin
- √ Trees – chestnuts to play with and learn from
- √ Energy-saving light bulbs – we've made the change
- √ Richard Hudson Kindergarten Treaty – looking after self and others
- √ Healthy Heart Award (Heart Foundation) – healthy food, water, exercise
- √ Aerobics for Adults – Grace's awesome weekly sessions
- √ Encouragement for whānau walking Dunedin Half Marathon
- √ Role-modelling sustainable practices to children by adults
- √ Caring for the kindergarten animals
- √ Visiting St Andrews Rest Home each term

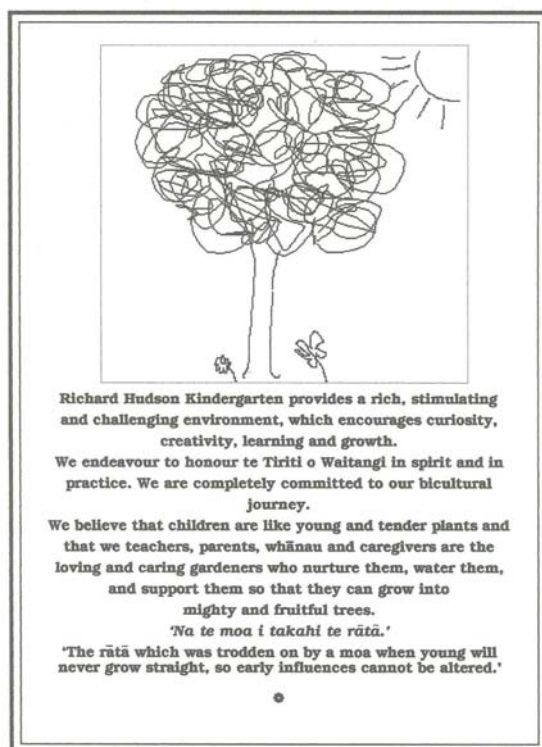
The challenge for these teachers was research question two:

1. What philosophies and policies guide teachers/whānau in their efforts to integrate issues of ecological sustainability into their current practices?

**2. How are Māori ecological principles informing and enhancing a kaupapa of ecological sustainability, as articulated by teachers, tamariki and whānau?**

3. In what ways do teachers/whānau articulate and/or work with pedagogies that emphasise the interrelationships between an ethic of care for self, others and the environment in local contexts?

4. How do/can centres work with their local community in the process of producing ecologically sustainable practices?



Their kindergarten philosophy statement drew on a Māori proverb which recognises that young children are like young saplings and that therefore their spirit must not be trampled upon.

## The teachers' revised research question:

By learning about Ranginui [Sky Father] and Papatūānuku [Earth Mother] can we inspire our children and whānau to consider making ecologically sustainable choices?

'The seed of this research has been planted, is being watered every day and is growing. Right from the start we decided that whatever direction we went in and whatever teaching and learning happened with the children, it had to be done gently and in a way that encouraged empowerment and positivity. We have focussed on this positive aspect to our study to avoid creating guilt and fear.'

(Teachers, Richard Hudson Kindergarten)

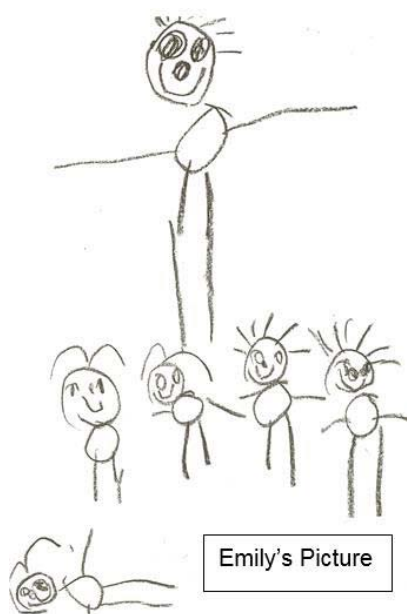
## Involving the wisdom of Elders



We consulted with Huata Holmes, our Kaumatua (Māori Elder), for guidance, expert knowledge and inspiration. The Southern Māori perspective is important. In order to add authenticity and depth we arranged for Huata to come and narrate his southern mythology/stories/pūrākau to the children and whānau [families] as told to him as a child by his grandmothers and great grandmothers. Huata's kōrero [speech] was excellent and by working together we have achieved more of a shared understanding. He told of the great waka [canoe] of Aoraki coming through the sky down to the South Island. He also used the waiata [song] *Hoea te Waka* [Paddle the Canoe] to support his korero. This has become a real favourite. His korero has supported our teaching of the importance of Papatuanuku in our lives.



## Emily's picture



Emily has drawn her understanding of Ranginui [Sky Father] and Papatūānuku [Earth Mother] and their children, depicting the original family according to Māori cosmology, before the parents were separated by one of the children, Tāne Mahuta.

## Children showing empathy for Ranginui and Papatūānuku (Sky Father and Earth Mother)

In Māori cosmology, Ranginui and Papatūānuku were separated by their children. When Huata shared this story with the children at Richard Hudson Kindergarten, it had a great impact.

Lily, wrote her own story to accompany her artwork, portraying the pain of Rangi and Papa's separation: "Rangi is at the top. He is really, really close to the children. You can't see the baby because he's in the ground with his mother. They pushed them apart. The earth mother wasn't close to Rangi anymore. So. So. So. So. Sad"



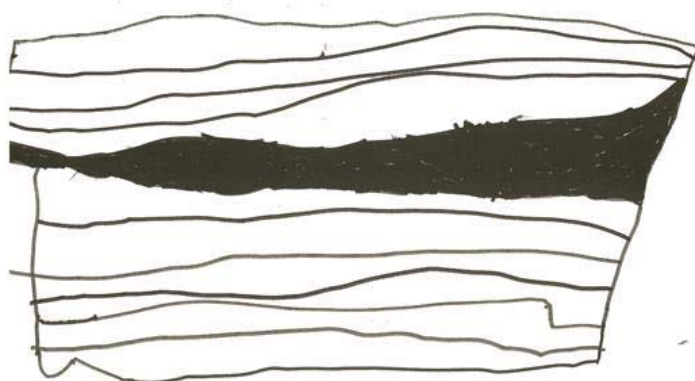
## Bonnie's pictures of Ranginui & Papatūānuku



‘When Bonnie looked at the photos she had taken of Rakinui/Ranginui and Papatuanuku one day on the children’s camera, she said it was “the sky and the ground”. When I asked her to tell me about the earth mother she said “she misses her Dad”. When I asked her to tell me about the sky father she said “he misses her, his Mum. His son pushed them apart – they used to be together”’.

## Stirling's picture of Ranginui & Papatūānuku

‘Stirling’s artwork is more abstract. He has interpreted the story as layers – the most dramatic being the dark layer between the sky and earth (the children). His picture was drawn after being taught about leaves turning to humus and then to soil and how it nourishes Papa. Leaves from our kindergarten’s trees were used to show the gradation of the decomposition



Stirling's Picture

## Concern for Ranginui [Sky Father]

10/6/8  
The other day we were a bit late for school, Petra wanted to pick up the rubbish around the neighbourhood. She said there was rubbish on The Earth Mother's Body (Papatūānuku) She is quite concerned about smoke going into Rangī the Sky Father's lungs + it would be hard for him to breathe! We want to do a beach clean up too.

'Petra has used the information given to her at mat times to add depth and concern to what she knows of the world. She has spontaneously decided to pick up rubbish in her neighbourhood because of her concern for the earth mother. The personification has allowed her to deduce that the smoke from chimneys would not be beneficial to Ranginui's lungs, making it hard for him to breathe. Petra is thinking further afield too. She wants to go to the beach and do a clean up with her family. She has thought a lot about these things.'

## Caring for Papatūānuku [Earth Mother] Collecting rubbish from the nearby Kew Park

By teaching the children about the importance of looking after Papatūānuku, they are learning, thinking and teaching others about the conservation and protection of the taonga of the land. The whenua is of utmost importance in the production of food, which affects us all. It is about our wellbeing. This is empowering the children to learn to become the kaitiaki/guardians of the land.



## Teachers' reflections...

'The story of Rakinui/Ranginui and Papatuanuku is a wonderful story for young children to be exposed to. It gives them a personification of sky and earth to embrace and understand. It invites them to see the earth and sky through their own eyes and through their understanding of family. A mother, a father and some children – just like themselves. A family. A family who have had to face challenges and change, and who have new challenges to face and problems to solve. Perhaps, just like them. Knowledge of Rakinui/Ranginui and Papatuanuku also gives our tamariki a seed of knowledge and concern about the vulnerability of our world. We must all do what we can to look after Mother Earth and Father Sky. By giving the young learners of our society ecological strategies in a realistic context, we are laying the foundations of a generation of earth users who know to care.'

## 'The Free Shelf' Manaakitanga – Caring & Generosity



'It was decided to introduce a 'free shelf' to encourage reuse. The idea was to have a permanent shelf where any sort of goods could be exchanged for no cost. At first it was only the staff putting things on the shelf, but gradually whānau have begun *giving* and taking from the table. Recently someone brought food items. The flow of give and take is beginning to happen. Kindergarten children and their siblings are noticing toys on the shelf and enjoying the free aspect'.

# Learning about caring for animals with the Society for Prevention of Cruelty to Animals



‘As part of caring for others we decided to have a collection of food for the SPCA animals – the families supported this very well, overflowing a large bin. Our children had a visit from Stef from the SPCA, with her dog, Wilbur, and cat, Lucy. She shared about caring for animals, kindness and how to approach an unknown dog. A week later we visited the SPCA and got to see how they look after the animals (Exploration/Mana Aotūroa: *working theories about the living world and how to care for it*, Te Whāriki page 90)’

## Caring for kindergarten pets



‘We encourage the children to care for animals on a daily basis by caring for our own kindergarten pets (hens, rabbit, guinea pigs, fish). The children are now categorising their food scraps and placing them in the appropriate bin. As the children give the hens their scraps, they in turn supply them with eggs. We often have new pets come to kindergarten with our families for a mat time visit’.

## Planting fruit trees, linking to both Māori and western worldviews

‘These concepts have been reinforced through teaching about the food chain, photosynthesis, growing bean seeds, planting a lemon tree that was given to us, conservation through rāhui [protections] and respect for Tane’s children, and references to Papatūānuku and Ranginui’.



## Valuing Indigenous Relatedness to the Earth

Indigenous accounts of how we are connected to the animate and inanimate world have transformative potential as metaphors of relatedness and reparation. Pedagogical practices honouring of traditional local knowledge and ways of understanding our place in the world, contain a spiritual resonance arising from their deep, intrinsic recognition of the earth’s healing energy. Educators are in the position to employ such narratives to generate cultural change founded in a heartfelt ethic of respect, care and interconnectedness embracing ourselves, each other, and the natural world. (Ritchie, 2010, p. 250-251)

## References

Ritchie, J. (2011). Caring for Ourselves, Others, and the Environment: Applying an Indigenous Paradigm in Early Childhood Education in Aotearoa, New Zealand. In J. Lin & R. Oxford (Eds.), *Transformative Eco-Education for Human and Planetary Survival* (pp. 239-253). Charlotte, NC: Information Age Publishing.

Ritchie, J., Duhn, I., Rau, C., & Craw, J. (2010). *Titiro Whakamuri, Hoki Whakamua. We are the future, the present and the past: caring for self, others and the environment in early years' teaching and learning. Final Report for the Teaching and Learning Research Initiative.* Wellington: Teaching and Learning Research Initiative. Retrieved from <http://www.tlri.org.nz/tlri-research/research-completed/ece-sector/titiro-whakamuri-hoki-whakamua-we-are-future-present-and>.