Envisioning student possible selves in science

Addressing 'plant blindness' through place-based education

TLRI RESEARCH

TEACHING & LEARNING RESEARCH INITIATIVE TLRI
Nāu i Whatu te Kākahu, He Tāniko Taku

Our team includes Chloe Stantiall from Silverdale Primary School, Natalie Thompson from Berkley Middle School, Nick Bryant (Ngā Puhi and Ngāti Whātua) from Matamata College as partners and co-investigators with Bronwen Cowie, Katarina Edmonds, and Maurice Cheng of the University of Waikato.
We co-planned six teaching sequences across three schools, and co-designed data collection and analysis strategies suitable for students.

Introduction

We aimed to develop primary, intermediate, and high school students' sense of place and science-related possible selves through local curriculum units that focused on plants. We chose plants because, compared with animals, they are often overlooked (hence the phenomenon of 'plant blindness'), as is their part in realising many sustainable development goals. Our curriculum units covered biological, personal, social/ cultural and political/economic aspects of plants (kūmara, kōwhai and harakeke being examples our teacher partners suggested). Hence, the project harnesses the values of place-based education in supporting students to develop a sense of 'who am I' with respect to 'where am I' in fostering their learning of science and development of aspirations to participate in science. Our key research question is as follows:

What can place-based plant-focused science teaching and learning sequences look like?

What we did

- We had half-day to full-day team meetings to plan the teaching and learning sequence together. In this way, teachers across levels contributed and learned from each other. In particular, we explored how a particular plant could create learning opportunities for students at different levels.
- Each teacher conducted two teaching and learning sequences. Chloe's sequences were on harakeke and kōwhai respectively for her Year 5/6. Natalie's sequences were on kūmara for Year 7/8. Nick taught the sequence on kūmara for two Year 9 classes.
- We used a diverse range of data, including artefacts and recordings of our collaborative planning meetings, field notes and artefacts of classroom teaching, and simple surveys, to identify students' attachment to plants and their envisioning of science-related possible selves.

Key features of the teaching and learning sequences

- The richness of what teachers and students achieved in one-week teaching sequences illustrates the value of a short, intense and in-depth focus; it illustrates the breadth of learning that can be achieved through expansive focus on one plant.
- Each of the teaching and learning sequences, in different ways, included: (i) stories about and practices for the past cultivation, significance, and usesw of the chosen plant, (ii) direct experience with the plant and/or some of its aspects, and (iii) consideration of current research about the plant. This breadth of focus allowed us to include Mātauranga Māori, and our own and students' funds of knowledge in the curriculum/ lesson sequence in meaningful ways. The research report provides some vignettes of the teaching. We summarise some key focuses of the sequences in the following table.

Implications for practice

- Teachers' family/cultural background and informal knowledge are important resources for helping students to envision science-related possibilities. (As we found students were better engaged when teachers shared stories and whakapapa about themselves that were related to science, e.g., gardening, cooking, activities of/ with their whānau, where they were linked to/ their 'place')
- Make active use of the school grounds/ immediate local environment (As we found the familiar school grounds became sources of wonder and learning when students intensively interacted with the focal plants on campus, e.g., seed hunt, and re-visiting kōwhai trees as they prepared infographics, identifying the tūpuna leaves of harakeke, testing of soil quality at various spots around the campus for kūmara planting.)
- A single plant can provide engaging and exciting learning experiences that address plant blindness and develop a botanical sense of place among students (When ideas and practices from its past, present and future are included that involve science and Mātauranga Māori as reflected in the table).

	Kōwhai, Year 5 & 6 (Chloe)	Harakeke, Year 5-6 (Chloe)	Kūmara, Year 7 & 8 (Natalie)	Kūmara, Year 9 (Nick)
Past	Uses and significance of various parts of kōwhai trees.	Making of harakeke products with & without machines, the significance of harakeke in our history	Cultural history of kūmara – Whakaotirangi scientific practice	Origin and journeys of kūmara, cultural history of kūmara – the major carbohydrate source, Nick's whakapapa Present
Present	Kōwhai seed hunt, observations of kōwhai trees on school grounds (e.g., leaf forms, how flowers become seed pods), gully walk.	Identifying harakeke on school grounds, observing harakeke leaves guided by Mātauranga Māori, Tikanga of harvesting harakeke leaves	Preparing kūmara tubers (in May), investigating the best place on the school grounds to plant kūmara based on Whakaotirangi's knowledge (in Sept), planting of kūmara when kōwhai is flowering	Who can be scientists?, current research about kūmara, planting as involving science in gardening and agriculture, and impact of extreme weather on kūmara yield in Aotearoa
Future	Designing infographics of kōwhai so visitors would know about them on the campus; contributing to iNaturalist.	Sharing of knowledge for middle school students, new commercial products from harakeke	Planting of kūmara for the next cohort of students to celebrate Matariki 2024.	The future of the kūmara agriculture business amid climate change

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