



**SOUTH AUCKLAND  
PROJECT SHOWCASE  
2020-2022 VOL. 2**







# **SOUTH AUCKLAND PROJECT SHOWCASE 2020-2022 VOL. 2**

**Everyone has a question: what's yours?**

**If you had MONEY and EXPERTS to help,  
could you answer it?**



**TE HONONGA  
AKORANGA  
COMET**



**MINISTRY OF BUSINESS,  
INNOVATION & EMPLOYMENT  
HĪKINA WHAKATUTUKI**



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# INTRODUCTION

## *Whaowhia te kete mātauranga*

*Fill the basket of knowledge*

Welcome to our latest Curious Minds South Auckland Project Showcase, in which we celebrate participatory science in our communities — and the leaders and young people that make these projects a success.

Participatory science engages young people in practical, collaborative STEM learning. Inspired by the whakataukī above, we understand that education is not a passive pursuit but an active and immersive experience. Hands-on investigations, experiments and designs can all help bring science and technology to life in a way that empowers students to question, analyse and innovate.

In this showcase, we share inspiring stories of students filling their kete with many different kinds of knowledge. Participants explore science and technology, of course; but they are also developing important skills like problem-solving, communication, leadership, teamwork, language, literacy and cultural understanding.

These projects were all completed during a period of significant disruption to schools, and we commend students and project partners for their perseverance in the face of delays, changes and other challenges.

None of this would have been possible without the dedicated teachers and scientists that support the projects. We also want to acknowledge the hardworking team behind the scenes: the support staff, administrators and senior leadership.

In times of change and difficulty, we know it is easy to stick with what has always been done. Our project leaders, however, are all eager to innovate and problem solve to get their projects over the line. Their commitment to filling the basket ensures that students have access to diverse opportunities for growth and development.

Thank you and keep up the great work!

Ngā manaakitanga,

**Ying Yang, Project Manager**  
**Curious Minds South Auckland**

# PROJECT CRITERIA

## PARTICIPATORY SCIENCE PROJECTS MUST BE:

### EDUCATIONALLY VALUABLE

Offer enduring educational value and two-way learning opportunities for those involved



### SCIENTIFICALLY ROBUST

Tackle a research problem in partnership with STEAM experts, to generate new scientific and/or technological outputs

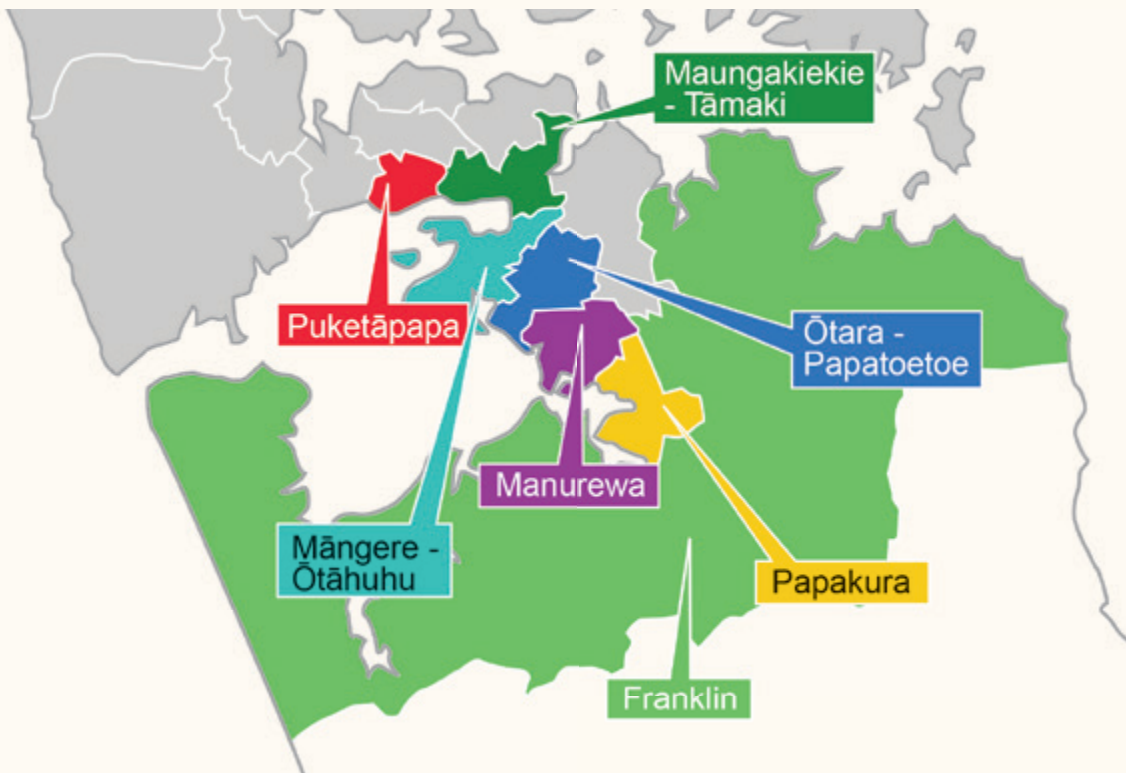


### LOCALLY RELEVANT

Involve community members in research that is engaging, locally relevant and community driven



## ELIGIBLE FUNDING AREAS IN AUCKLAND:



# PROJECT DATA (2020-2022)



PROJECTS FUNDED



YOUNG PEOPLE ENGAGED



SCHOOLS INVOLVED



ORGANISATIONS INVOLVED



# \$451,325

IN FUNDING DISTRIBUTED

# 25+



STEAM DISCIPLINES UNDER INVESTIGATION



# CASE STUDIES



## STORMWATER SLEUTHS

TREAD LIGHTLY CHARITABLE TRUST

*Is our school community contributing to stormwater pollution in our local catchment?*

***Tread Lightly engaged 178 students from four schools (Papatoetoe Intermediate, Wesley Primary, Maraetai Beach and Point England Primary) to investigate what was going into their stormwater drains.***

The project began with an audit of the participating schools' stormwater drains. The students used LittaTraps to catch rubbish going into the drains before it could reach their local waterways. They checked and cleared the traps regularly.

An interesting find at some of the schools was that the traps collected a significant amount of rubbish even in the midst of a COVID-related lockdown, with the implication being that members of the wider community were contributing to the litter problems at the schools (as well as using the school grounds even when they were closed).

Beyond litter, the students also learnt how their local waterways are connected and how litter from one location can make its way out to the ocean.

Project lead Monique Russell says the project made the students feel more connected with their local awa and helped them to develop a genuine understanding of the paths that connect their school to the wider world.

The findings from this project prompted one concerned student to write a letter to then Prime Minister Jacinda Ardern, sharing her concern about the amount of plastic entering Aotearoa's stormwater drains.

Other students shared their learning through art exhibitions, comic strips and a joint presentation that was shared with Auckland Council's Healthy Waters stormwater management team.

In addition to the four schools supported by Curious Minds, ten schools funded by Auckland Council's Healthy Waters team also participated in the *Stormwater Sleuths* programme. Together, more than 760 students across Tāmaki Makaurau participated in this citizen science project.

Scan the code at right to view their data.







## FOLLOW THE SUN – ANCESTORS OF MAUI

HOMAI PRIMARY SCHOOL

*Why is solar power a sustainable energy source and how can the Homai community adopt its use?*

*Twenty-two Year 5 students 'followed in the footsteps of Maui' to capture the power of the sun while researching the production and use of solar energy. The students worked with Kia Kotahi Ako Trust to trial the We Share Solar programme, an innovative educational resource that empowers students to learn about climate change, renewable energy sources and electricity generation.*

The students put their theoretical learning into practice by building their own solar-powered units that could turn on a light bulb or drive a small motor. The hands-on activities involved in building the 'solar suitcases' helped the students understand how simple devices and physics come together to harness a powerful resource.

Importantly, the project has also shown the students and their whānau that they could become innovators and

engineers, working to design new products and solutions for the climate challenges they will face in the future.

Lead teacher Peter Forsyth felt the project was timely and relevant given that many of his students' families came from the Pacific region, where "solar power is a step to combating [rising ocean levels]."

Homai Primary School was the first in the world to trial the We Share Solar programme at primary school level. School leadership plans to use the project learnings to advocate for a new electric van (charged by solar panels on the school's roof) to replace their diesel van.

Kia Kotahi Ako Trust also intends to expand on this project by working alongside local solar power companies to teach more children about the potential of solar power.



Newsroom profiled this project as part of its climate change video series, *Our Electric Future*. Scan the QR code at left to watch the video. Note: the Homai segment begins at the 5:40 mark.



## INVESTIGATING SOUTH AUCKLAND STREAMS

WHITEBAIT CONNECTION

*How can we tell if a stream is healthy, and what can we do to protect biodiversity in south Auckland streams?*

*More than 300 students from four schools (Drury, Papatoetoe West, Maraetai Beach and Sutton Park) worked alongside ecologists from Whitebait Connection to undertake a study of Puhinui Stream and their local awa with an aim to compare the water quality and biodiversity of different stream environments and inspire action to restore degraded stream habitats.*

The project began with a workshop and water sampling of the Puhinui Stream at Auckland Botanic Gardens as part of the 2021 Eye on Nature event. This introduced students to key water testing and biodiversity monitoring concepts in a relatively healthy stream environment. The high number and diversity of fish and macroinvertebrate species present captured the students' attention and inspired their curiosity about stream life.

Scientists then supported the students to test the waterways near their schools. The children were eager to catch and identify the macroinvertebrate creatures present in their local streams and compare them with what they found at the Botanic Gardens.

By analysing results and examining the food web, the students were able to determine if their stream habitat was healthy or not. This led to many discussions about

what could be done to restore or improve habitats to enable greater biodiversity to flourish.

Students created artwork and infographics to highlight their favourite taonga species and spread the message about how to protect their local streams. These were displayed at an art exhibition at the Botanic Gardens, where hundreds of visitors viewed the impressive collection.

Several schools have committed to continuing with their stream monitoring and restoration efforts, ensuring that the learning from this project will continue to inspire the next cohort of budding environmentalists.

**"** *The students felt engaged and connected to their local streams. They thought long and hard about what they could do to make them a nicer place for the animals to live.*

Ella Walmsley, educator  
Whitebait Connection

**"**



## BEE BENEVOLENT

JAMES COOK HIGH SCHOOL

*How does a bee's habitat affect the quality of honey it produces?*

*Senior horticulture students at James Cook High School trained to be young beekeepers for this enterprising project. Working alongside STEM experts and apiarists from Bees Up Top, the students set up beehives in different locations across south Auckland to investigate whether food forage impacted the quality of the honey that bees produced.*

First, the students set up beehives in suburban Papakura and Karaka and in rural Kingseat. Using these beehives, they spent the next two years studying the conditions required for bees to thrive and developing their practical beekeeping skills.

The students also extracted honey from the hives, which was sent to a laboratory for analysis of its diastase activity and electrical conductivity — both common measures of honey quality.

Based on these test results, the students established that different foraging sites impacted the properties of the honey from each hive, with the rural honey showing higher levels of diastase activity and antimicrobial properties, likely due to a higher density and variety of forage (particularly mānuka) in the Kingseat area.

The study highlighted the symbiotic relationship between bees and humans and how important it is to protect bees and their foraging habitats.

Lead teacher Nilesh Sharma believes the project's real-world context helped make the learning meaningful and worthwhile for the students, who might otherwise have disregarded a STEM project as being too challenging or difficult. Instead, they came away with real life skills.

As well as beekeeping, the students learnt about scientific experimentation, project management, communication, and even business and marketing. They have successfully bottled their first batches of honey and are selling these at school to support the continuation of the horticulture programme.

Along the way, James Cook High School became NZQA accredited to deliver Year 12 standards in apiculture — a first for an urban school in Auckland. The science team plan to build on this success to develop a larger apiculture programme that connects students directly with industry and potential career pathways.



## KITCHEN TOOLS REIMAGINED

MT RICHMOND SPECIAL SCHOOL

*How can we use the engineering design process to make cooking more accessible for people with visual and physical impairments?*

*Although senior students at Mt Richmond Special School learn many practical skills for independent living, they were confronted with a challenge when they realised that a classmate with visual and physical impairments was unable to participate in their cooking classes. This sparked the idea for this project to redesign everyday kitchen tools to make them more accessible.*

Partnering with Dr Stephen Reay and Zora Situ from the AUT School of Design, the students learnt about the engineering design process and brainstormed a wide

range of product ideas that could be developed. They settled on designing a knife and chopping block that could be safely used with one hand.

The journey from initial idea to final prototype took many hours of research, design, testing and redesigning. The students also collected feedback from community members and key stakeholders like the Independent Living Trust, which supports people living with disabilities.

Prototyping was made easier through the purchase of a new 3D printer and facilitated workshops with experts from MOTAT and AUT.

The final prototype was completed in late 2022, and the students entered their project in Samsung's 2022 Solve for Tomorrow design competition. The project took second place.

Seeing how proactive and creative students were about the project, and how engaging it was for their community, teachers next plan to incorporate more STEM learning throughout the rest of the school going forward.

**11** *Students are already submitting ideas for STEM projects for next year. This alone shows how valuable this project has been for stimulating interest and engagement in STEM.*

Rachel Titchener, teacher  
Mt Richmond Special School





## KO AU TE AWA, TE AWA KO AU

TE ARARATA STREAM TEAM

*What is the effect of urban development on the health of urban streams in Tāmaki Makaurau?*

*"I am the river, the river is me." This whakataukī served as the inspiration for Te Ararata Stream Team's environmental project, which engaged over 160 students to complete nearly 2,000 volunteer hours in a wide-ranging investigation into how urban densification impacts local awa.*

This project expanded on Te Ararata Stream Team's 2021 project, *Aratakina A Moemoeā*, which investigated the biodiversity of the local Te Ararata Stream along different stretches. The previous project identified tangible differences in stream health in areas with established planting compared with areas of mown lawn.

For this extension, the team investigated whether there was a correlation between urban density and water quality in four streams across south Auckland: Te Ararata, Puhinui, Pourewa and Ōtara. Participants took water quality samples from two sites at each stream, one in the upper catchment and one in the lower catchment.

Whilst environmental scientists from the University of Auckland provided guidance, the group mainly utilised a tuakana-teina approach for on-the-ground training, with older students (or 2021 project participants) showing their younger peers how to take and analyse samples.

Connecting the mauri of local streams with local people has been a big outcome for this project, and it has inspired a keen enthusiasm for environmental learning in many participants.

Eight participants obtained work based on their project experiences, and project lead Pragna Patel is hopeful that more rangatahi will follow in their footsteps as the Te Ararata Stream Team looks to continue their restoration efforts in the future with the same tuakana-teina approach to learning and engaging young people.

**"** We set out to offer a way of learning that was soothing to contrast the stress learners were experiencing with Covid related learning gaps... [Students] reported they enjoyed being outdoors and still achieved learning.

Pragna Patel, project lead  
Te Ararata Stream Team





## HEALTHY CONNECTIONS

TAMAOHO SCHOOL

*How can we teach our community about healthy eating through traditional crops and cooking?*

**More than 270 students from Tamaoho School participated in a multi-disciplinary project studying healthy kai.**

Community sat at the heart of this project from the outset. Being relatively new, Tamaoho School wanted to connect with longtime local residents as well as those who were new to the area. Food is an obvious connector, bringing people together and supporting physical and social well-being, as well as being rich in learning contexts.

Over the course of the project, the entire school collaborated to create a māra kai (food garden), pātaka kai (community pantry), hāngī pit and outdoor kitchen.

Students in years 1–2 learnt about the fundamentals of horticulture: how plants grow and what their life cycles are, while students in years 3–4 dived into nutrition, finding out how a māra kai can be used to generate healthy meals. The students in years 5–6 focused on the design and technology aspects of the project.

Project partners from the Ngāti Tamaoho iwi helped to build the hāngī pit and pātaka kai, which the school will use to donate excess food and vegetables from the māra kai to local families.

The school used the hāngī pit for the first time at a special whānau day in April 2023, at which they provided more than 200 meals for the children and their families. The outdoor kitchen was also in full swing, running a sausage sizzle all evening.

Following their hākari (feast), tamariki and parents were invited to do some planting in the garden. Once harvested, the vegetables will be used during the school term when students are cooking in the outdoor kitchen.

In keeping with the project theme, the whānau day was a fantastic opportunity to bring the community together in a relaxed atmosphere and for the school to build healthy connections with their ākonga and their whānau.

To wrap up this project, the taura are putting together a recipe book to share their combined learning with their whānau and help promote healthy and delicious meals.



*Having the garden open and [holding] activities there meant that families saw what the learners have been doing, loving it and then offering support in future.*

Chynna Butler, lead teacher  
Tamaoho School





## ADOPT AN ECOSYSTEM

SAASIA INC

*What makes up an ecosystem and how can we support different ecosystems to thrive?*

*Sixty-eight tamaiti from two aoga amata (Fetu Taiala and Fetu Aolele) in Māngere undertook a guided investigation into ecosystem sustainability. The project's aim was to develop a love for nature, setting the students up as kaitiaki for the world around them.*

During the project, the children created a terrarium that would act as a small ecosystem for them to monitor over time. They learnt about the difference between abiotic and biotic organisms and how an ecosystem is created using water, sunlight, oxygen, soil, temperature and nutrients. They also learnt how these elements must all come together to help plants grow and thrive.

**“** *This opportunity has given the children a chance to explore and be empowered by the knowledge that they are capable of nurturing for growth.*

Pomate Westerlund-Ekepati, teacher  
SAASIA

Under the guidance of STEM experts from Auckland Teaching Gardens, the aoga amata extended the project by setting up a veggie garden nearby. The experts also showed the children around other, more established community gardens. This saw the children thinking beyond the terrarium to real life and discovering how fruit and vegetables are grown to feed their families.

The teachers evaluated the outcomes of the children's work using pictures, videos, stories and drawings. Talanoa featured heavily as well, with teachers holding regular sessions with parents and caregivers to explain what their children were learning, reflect on how that learning was being shared at home and whether the children were displaying any changed behaviours as a result of their new interests.

This project also inspired the teachers to do further research into areas of STEM learning as they could see how engaged the children were with the project's hands-on activities and how excited they were to be working as little scientists and sharing their learning with their families.





## PULEGA OIL

PASIFIKA EARLY LEARNING PUNA OLE ATAMAI AOGA AMATA

### *Why is coconut called 'the tree of life'?*

*The Sāmoan proverb of "E le sua le lolo i se popo e tasi aoo manogi o le lolo e faasoa ai manatu" ("The making of oil needs more than one coconut") addresses this project's key enquiry — an investigation of the importance of coconut to Sāmoan health — and touches on the involvement of the wider community.*

Drawing on knowledge and experience from parents and kaumatua, tamaiti at Pasifika Early Learning (PEL) in Māngere participated in the process of creating coconut oil. They learnt about traditional methods of preparation, including how to cut coconut flesh, grate it and squeeze it to produce juice, as well as how to cook the juice and separate out the oil.

The children also investigated traditional Sāmoan uses for coconut oil, making their own samples of massage oil in the process. PEL then hosted a stall in the local town centre to show off their coconut oil, decorating the display with coconut shells and husks.

Art featured heavily in this project, with the children creating picture frames, bangles, cymbals and plant pots from coconut skins and husks, ensuring that every part of the coconut was used and nothing was thrown away.

This project was shared with the community in many ways. PEL invited other local ECE centres to find out about the project and what the students had learnt so they could lead this inquiry at their own schools.



*I feel this project has 'pushed' each staff member to achieve better teaching, [build better] relationships with the children [and] their matua, and have a face in the community. Everyone's input is important, including the children's.*

Liz Sio, head teacher  
Pasifika Early Learning



To read more about how talanoa was used in this project to support STEAM teaching and project evaluation, see page 20.



## RECYCLE A DEVICE

### DIGITAL FUTURES AOTEAROA

*How can digital devices be repaired and refurbished, and what happens at the end of their useful life?*

*Recycle A Device (RAD) is a nation-wide charity tackling the dual challenges of e-waste and the digital divide by repairing and refurbishing old devices to redistribute to communities in need.*

In an effort to train up local rangatahi with in-demand IT skills, RAD teamed up with four south Auckland schools to establish 'RAD STEM clubs' — local hubs run by secondary school students to collect, refurbish and redistribute laptops in their community.

More than 90 students from Papakura High School, Marcellin College, Pacific Advance Secondary School and Onehunga High School participated in RAD workshops with tech partners from Remojo Tech, Network 4 Learning, Entelar and RemarkIT.

Each partner showed students different aspects of the digital device life cycle, teaching them valuable skills around cleaning data, upgrading software, repairing hardware and harvesting parts (to repair other devices).

Students also researched end-of-life disposal options and found that Aotearoa NZ lacks the recycling infrastructure to completely recycle devices domestically.

Repairing, reusing and extending the usefulness of working components is therefore one of the best ways to minimise e-waste that would otherwise end up in landfill.

## WAI WE O TARA LEAD

### ACCELERATING AOTEAROA INC

*How can we utilise AI technology and local knowledge to find solutions to the wastewater overflow problem in Ōtara Creek?*

*In 2021, students at Accelerating Aotearoa's Geek Camps conducted a scientific inquiry of their local Ōtara Creek and discovered that raw sewage runs into the awa almost every time it rains. In 2022, these students continued their investigations to find out where the sewage run-off originated and if they could find ways to stop it.*

In their investigation of the waterways, the students realised that upstream issues — such as broken and leaking infrastructure or networks under strain from denser housing developments — could be contributing to the problem.

As the wastewater can often come from many unknown sources, the students wanted to work on educating the community on the impact their actions were having on the local awa. They also wanted to advocate for more education and accountability around wastewater overflow issues. To achieve these goals, the rangatahi created the Curious Minds podcast.

Rangatahi designed, built and ran a new podcast studio at the Accelerating Aotearoa headquarters. They interviewed a range of guests including local experts, scientists, urban planners, celebrities and community leaders to gather their insights on Ōtara Creek. An important learning that came from this podcast was the value the community places on the awa.

Another group of Accelerating Aotearoa's Geek Camp rangatahi sought to address the wastewater issues through innovation and AI technologies.

With help from Microsoft, they created an entry for the Microsoft Imagine Cup, an international design competition. The rangatahi designed a drone that could be used to monitor the stream when it rained. Named the Flying Taniwha, this drone would automatically fly out when it rained, collect samples for water quality tests and then return to base.





“ *Our enquiry revealed that water is more important for a community than just [being] something to drink or clean with. From an indigenous perspective, water is the key component for health, prosperity and long-term wellness. Understanding [this] allows our next generation to carry on these important lessons [to] future-proof our community.*

Judy Speight, project lead  
Accelerating Aotearoa Inc



The Accelerating Aotearoa Curious Minds podcast highlights the science enquiry, communication and technology skills that taura have picked up on this journey. Scan the QR code at left to listen to the podcast on YouTube.

# NEW & CONTINUING PROJECTS

## 2021

### HEALTHY PEOPLE, HEALTHY ENVIRONMENT

ROSEHILL COLLEGE

Working alongside environmental scientists and public health specialists from AUT and Auckland Council, students at Rosehill College are investigating what is in their school rubbish bins and how they can minimise the impact of their school's waste. Initial audits indicated high amounts of food scraps going in the bin, so the group will investigate options for composting to see what methods are most efficient for creating high-quality compost from organic food wastes.

### HE WAKA EKE NOA

GLENBRAE SCHOOL

Students from Glenbrae School in Glen Innes are designing their own hauora (tranquility) and Pasifika gardens to create new spaces in their school for recreation, food growing and cultural appreciation. Through partnerships with Watercare and Auckland Botanic Gardens, the students are not only learning how to plant their garden but also how to make it thrive while conserving as much water as possible.

## 2022

### TE WAIHANGA KĒMU TOITŪTANGA – DESIGNING SUSTAINABILITY GAMES

INSTITUTION OF CIVIL ENGINEERS +  
TE KURA KAUPAPA MĀORI Ā ROHE Ō MĀNGERE

Engineers and technologists are at the forefront of tackling climate change, and those at the Institution of Civil Engineers (ICE) seek to inspire the next generation of innovators with a project that combines sustainability education, gaming and te ao Māori.

ICE is working with students from Te Kura Kaupapa Māori ā Rohe Ō Māngere to co-design a board game that will educate players about sustainability whilst also inspiring them to take positive actions in their own

lives. The 'learning through play' approach will expose students to concepts of game development and design, innovation, technologies and engineering careers related to sustainability.

### eDNA MONITORING

AORERE COLLEGE

Aorere College, along with council partners, has embarked on a ten-year plan to restore both their local park and Waokauri Stream, which has been overrun with weeds and invasive species. They are investigating the efforts of cleaning up this waterway through eDNA monitoring and comparison with the biodiversity of other, relatively 'pristine' streams in the vicinity.

### A SPOONFUL OF SUGAR

TANGAROA COLLEGE

With rising concerns about sugar consumption by our youth, Tangaroa College students are researching fructose (a common sugar found in fruits and juices) and how it is absorbed by the body. Students will investigate if fructose absorption varies in different people and what that means for our digestion of fruit sugars.

## 2023

### TE KETE ROKIROKI A WHAKAOTIRANGI

MOUNT ROSKILL GRAMMAR SCHOOL

Whilst the Puketāpapa area once hosted extensive kūmara cultivation, the recent yields from Mount Roskill Grammar School's māra kai have been poor and inconsistent.

Students intend to get to the root of the problem by investigating various soil compositions, landscapes and traditional cultivation practices to determine which variables might help to improve their vegetable crop. They will plant multiple garden beds with different soil types and will conduct a fair test experiment to analyse which soil provides the greatest yield.

For this project, the school is collaborating with local iwi, Sanctuary Mahi Whenua, Māngere Mountain Education Trust and Kōanga Gardens.

## **PŪTĀTARA – A CALL TO ACTION**

**CHRIST THE KING CATHOLIC SCHOOL**

In response to recent flooding events in Tāmaki Makaurau, Christ the King Catholic School has sprung into action. Ākonga in years 5 and 6 are investigating the local history of Puketāpapa and whether future flooding events in this area could be minimised by adopting a water-sensitive design approach to urban development.

Working alongside stormwater engineers and environmental scientists, the students will gain an understanding of stormwater systems and infrastructure, as well as what can be done to mitigate the impacts of flooding on people and environments.

## **INVESTIGATING EELS IN SOUTH AUCKLAND'S WATERWAYS**

**WHITEBAIT CONNECTION**

Whitebait Connection will lead conservation groups and tamariki from Māngere, Manurewa, Franklin and Pukekohe in an investigation of eel populations around south Auckland. They hope that determining the number and distribution of eel populations in different types of streams will help them understand what habitats the various eel species require, which will in turn inform future stream restoration and conservation efforts.

## **KAITIAKI O TE PUNA**

**AORERE KINDERGARTEN**

Tamariki at Aorere Kindergarten will undertake an immersive exploration of their local streams and waterways in this project that will see them develop environmental responsibility beyond the kindergarten.

Building on relationships with neighbouring schools, tamariki will learn from tuakana at Papatoetoe Intermediate School and Aorere College, as all three schools look to restore different sections of Waokauri Stream. They will start with an audit of the existing biodiversity and learn about what habitats and conditions are needed for taonga species to thrive in their awa.

## **KAITIAKI O MAUNGAKIEKIE**

**ROYAL OAK PRIMARY SCHOOL**

Eco-warriors at Royal Oak Primary School will investigate the effectiveness of predator control on native bird populations at Maungakiekie / One Tree Hill. The school is trialling the use of innovative birdsong monitors to analyse the type and number of birds present. Observations over time are expected to help build a picture of the impacts of predator control efforts on bird numbers. The project is supported by science and community partners from

the Tūpuna Maunga Authority, Predator Free 2040, Maungakiekie Song Bird Trust, the University of Auckland and Auckland Zoo.

## **WAAHI WHAKATAA – A PLACE TO REST**

**VAKA LTD + EDMUND HILLARY SCHOOL**

More than 100 Edmund Hillary students in years 7 and 8 will work together to design and build culturally responsive, environmentally friendly rest and play areas at their school to promote hauora, calm and well-being.

STEM experts from VAKA will guide the taura through the design process, including how to use 3D modelling and printing technology for prototyping. Once they have a suitable design, students will be tasked with testing materials, costing it out and preparing a business case to present to the school's senior management team.

## **THRIVE – SMART, SUSTAINABLE HORTICULTURE PRODUCTION**

**YOUTHTOWN INC + WAIUKU COLLEGE**

Year 11 horticulture students at Waiuku College have set themselves a challenge to make horticulture more sustainable using smart technologies and innovation. They will work with STEM experts from the University of Auckland and Youthtown to design and build a carbon-neutral, modular vertical hydroponic garden for growing vegetable crops.

Rangatahi will leverage knowledge from their rural south Auckland community on effective growing practices to inform their design and then share their innovations back to the local farmers and growers.

## **OPERATION AUTOMATE CRYSTAL PALACE**

**MANUREWA INTERMEDIATE SCHOOL**

Ākonga at Manurewa Intermediate School will use robotics and engineering design thinking to develop solutions for automating their school greenhouse (aka 'the Crystal Palace'). The challenge is to maintain constant light, temperature and humidity so the greenhouse's yield can increase while labour and maintenance requirements are minimised.

By automating greenhouse functions as much as possible, the school hopes to create a more efficient nursery to grow native tree seedlings, which they will gift to their local Adopt a Park programme for planting near local streams and waterways.

# THE POWER OF CONVERSATION

## Conversation

*(noun): conversation; plural noun: conversations*

*A talk, especially an informal one, between two or more people, in which news and ideas are exchanged.*

Conversations are essential for student learning. They can begin in the classroom, where a teacher introduces new STEAM (science, technology, engineering, arts and maths) concepts, and then continue at home, with students sharing what they have learned with their families or implementing them into their everyday lives at social events.

In this article, WeSTEM project manager Dr Sneh Patel reflects on different conversational tools that have been used for Curious Minds project evaluations, along with the value that these qualitative methods offer for understanding student engagement and attitudes towards STEAM.

## TALANOA BUILDS STRONGER RELATIONSHIPS AT PASIFIKA EARLY LEARNING

*'E pala le ma'a ae le pala le tala'*

*'Stones and rocks decay but words do not'*

A vital communication tool for Pasifika people, talanoa is about building respectful relationships through open and reciprocal interactions. Talanoa features heavily in the teaching and assessing of student learning at Pasifika Early Learning (PEL), a group of Sāmoan aoga amata (early childhood education centres) in south Auckland. See page 15 for details on PEL's *Pulega Oil* project.

There are different ways to practice talanoa, including verbally and non-verbally. Through the understanding of a child's facial expressions, for instance, a teacher can determine whether they have understood and are enjoying a particular subject.

PEL teacher Ofereia Tunufai-Pualau shares that talanoa will often last beyond the initial discussion. For tamaiti (young children), it can come out later in the day or later in the week, when they show their understanding differently, often through role-play, where they may begin to act out what they understand or replay what they have been doing earlier in the day.

Talanoa also complements art evaluation and drawing exercises, both of which can be effective learning evaluation tools. As many children love to draw, asking them to draw something based on question prompts can be an easy way to determine what they have learned in a project. However, it can sometimes be unclear what they have drawn.



By engaging in talanoa after a drawing session, the teachers can gauge the children's understanding and draw out the stories behind their drawings.

Timote Vaoleti, an expert in Talanoa as a research methodology, states that *"historically, research has been driven by hypotheses and often by an institution's approved questionnaires. These do not require a personal relationship between the researcher and the participant to obtain the information."*<sup>1</sup>

Talanoa provides youth with a comfortable and informal space to share their learning. It allows the evaluator to dive deeper into a student's understanding of a subject as there is more space for follow-up questions.

At PEL, using talanoa in an evaluation is a little like a tennis match. Head teacher Liz Sio describes this as 'talanoa-mai – talanoa-atu', wherein the students give their answers and then get follow-up questions from the teachers. This back and forth continues as the teachers gain an understanding of what the student has learned from the project and how they felt about it.

At an ECE level, this talanoa enabled teachers to evaluate students' interests of their science topic and what activities or learning they enjoyed the most.

<sup>1</sup>Vaoleti, T.M. (2006). Talanoa research methodology: a developing position on Pacific research. *Waikato Journal of Education*, 12, 21–34.

# CONSERVATION CHATS BROADEN UNDERSTANDING FOR STREAM TEAM

Te Ararata Stream Team is a community-based conservation group that participated in the *Aratakina A Moemoeā* project in 2021 (see volume 1) and the *Ko Au Te Awa, Te Awa Ko Au* project in 2022 (see page 11). The Stream Team is volunteer-driven and engages a wide collective of primary and secondary school students in place-based environmental education.

A sub-group within the Stream Team consists of young Burmese refugee students who meet weekly at a homework club in Panmure. Te Hononga Akoranga COMET interviewed the homework club students for a post-project evaluation of their Curious Minds research.

English is a second language for many of the students, so face-to-face conversations and group discussions were a particularly useful tool for project evaluations rather than traditional paper-based surveys.

As with PEL's 'talanoa-mai – talanoa-atu', a verbal evaluation does not always flow naturally. Establishing rapport and creating a safe, comfortable environment for students to express themselves is essential.

For their project, the Stream Team created a poster board to share research results at libraries across south Auckland. They used the board as a visual aid to guide discussions and evaluate learning — as the students were asked to describe the various results that were presented and what they meant, and they sometimes did not remember the specific content or required extra prompts to get the conversation flowing.

For example, when asked what they had learned, one student responded with 'chemistry'. The question "What did you learn about chemistry?" led to a discussion around pH levels, and how a low pH can indicate an acidic environment, whilst a high pH can indicate a basic environment.

When we asked the students if they wanted to be a scientist, only one of them put their hand up. Through follow-up discussions, it became clear that the students had a narrow perception of what science was and hadn't linked it to their career aspirations.



With further prompting, the students realised that doctors and engineers also use science skills and that even football players need to have an awareness of science through nutrition and physical education. These connections and learning would not have been made through a written questionnaire alone — conversations help to broaden student thinking and understanding.

There is no doubt that conversations are an effective tool when it comes to teaching STEAM concepts. They allow learners to share their ideas, ask questions and build understanding. It is important to consider the different ways in which people communicate, such as through talanoa and with visual or non-verbal cues, and how this can be used to make content relevant and specific to each learner.

Conversations can also be a useful tool for evaluating the learning outcomes from a STEAM project. Its reciprocal process invites follow-up questions, back and forth, which engages students and teachers in deeper reflection.

Through these qualitative outcomes assessments, we have identified how important it is for teachers to connect context-specific learning to science skills and careers and the value of collaborative, explorative teaching for engaging young people in STEAM.

Contact the STEM team to find out more about how Te Hononga Akoranga COMET can support you with evaluating the effectiveness of your STEAM engagement initiative.

To see snippets from the Te Ararata Stream Team homework club student interviews, scan the QR codes at right:



Project video



"When I grow up"



STEM v STEAM



STEAM role models

# 2022 FILM FESTIVAL



## PARTICIPATORY SCIENCE FILM FESTIVAL BRINGS STEAM TO THE BIG SCREEN

In October 2022, more than 300 attendees gathered in MOTAT's impressive Aviation Hall to watch the Participatory Science Film Festival, hosted by Te Hononga Akoranga COMET.

The film festival celebrated the community-based STEAM research projects completed through COMET's participatory science programmes, Curious Minds South Auckland and WeSTEM.

We believe that STEM is more than just experiments and prototypes — it is about exploring, creating and sharing new knowledge. Making a short film was the perfect challenge to encourage groups to hone their science communication skills and celebrate their learnings and achievements.

Prior to the festival, we invited project leaders to a workshop facilitated by No Six Media and Morgane Merien (Canterbury Museum), who passed on their knowledge and top tips for telling engaging science stories through video. The workshop gave attendees new confidence and enthusiasm for helping their students to document their learning journeys.

Fourteen groups submitted videos for the film festival, with participants ranging in age from toddlers to secondary school students. The films were largely produced by students and supported by teachers and science partners.

Curious Minds Project Manager Ying Yang believes it is important *"for young people to talk about their science learning because it allows them to reflect on what they know and retell it in their own voices. It makes learning so much more powerful and encourages others to get excited about science. I was so impressed by the knowledge, enthusiasm and humour in many of the films I watched."*

Alongside watching the short films, project groups were also greeted by two guest speakers, Hon Carmel Sepuloni, MP for Kelston, and Chris Muller, Director National Programmes at the Ministry of Pacific Peoples.

Ms Sepuloni shared her own science learning journey and her vision for all tamariki and rangatahi to be active lifelong learners.

Mr Muller shared that Pasifika peoples are expected to make up 30% of Auckland's workforce by 2026. He expressed MPP's desire to see a higher percentage of those jobs be in high value, creative and innovative industries such as science, technology, engineering, arts and maths.

Mr Muller says, *"We need to see STEAM celebrated within our communities and that's what is happening here today."*





Scan the QR code at left to view the short films from the 2022 Participatory Science Film Festival.

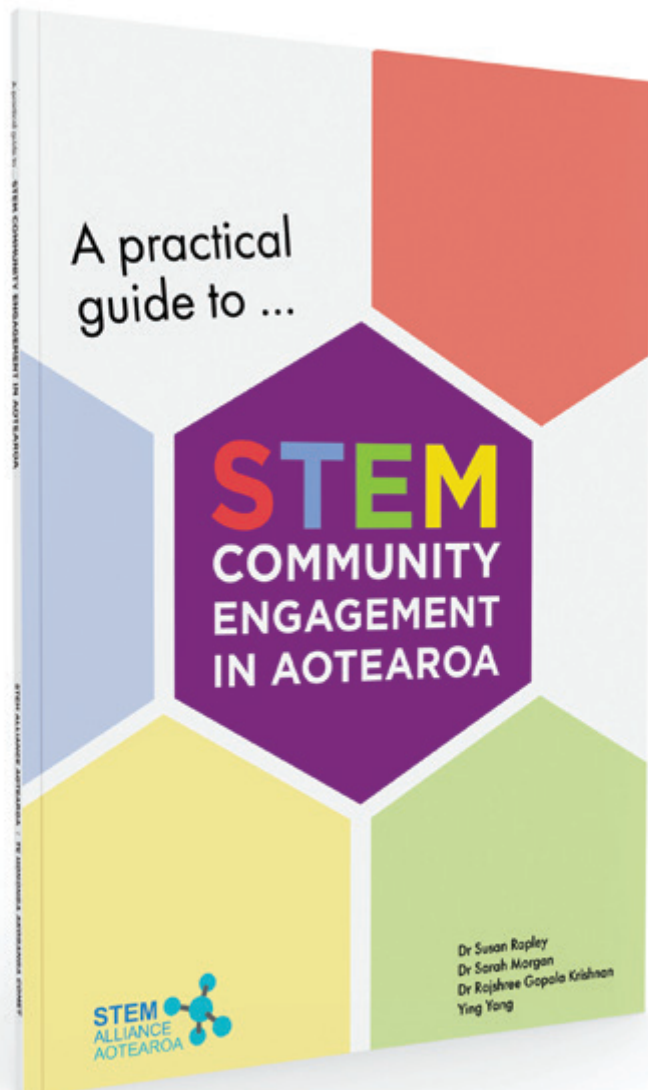
# STEM ALLIANCE AOTEAROA

The Curious Minds participatory science platform has consistently shown the value of community and science partnerships for creating engaging opportunities for students to explore science, technology, engineering, maths and mātauranga in real-world contexts.

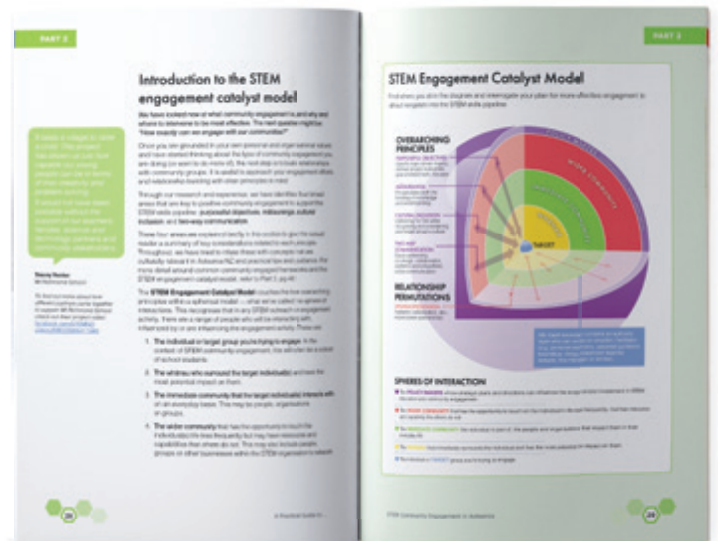
Successful project collaborations rely on a wide range of stakeholders coming together — students, educators, community members, businesses, academics and families.

The STEM Alliance Aotearoa network was created to strengthen these connections across the STEM sector. We provide resources, connections and advice to support businesses, educators and community facilitators to improve outreach and engagement across the STEM education system. Our vision is for a diverse and equitable STEM-literate Aotearoa NZ.

We know that community outreach and engagement initiatives work, but it takes effort. A Practical Guide to STEM Community Engagement in Aotearoa (see below) is an easy-to-use, research-based response to this challenge.



This three-part guide offers advice, tools and guidance to help educators, community facilitators and STEM professionals collaborate to show young people the value of science and technology.



Get your copy today at [www.stemalliance.org.nz/stembook](http://www.stemalliance.org.nz/stembook)





Te Hononga Akoranga COMET is an independent charitable trust and an Auckland Council CCO championing better and fairer education, skills and lifelong learning for all Aucklanders. We provide high quality and effective research, project development and leadership for cross-sector initiatives and action.

The participatory science platform is currently operating in south Auckland, Taranaki and Otago. It is an initiative under A Nation of Curious Minds, a government programme to encourage all New Zealanders to get involved with science and technology.

A Nation of Curious Minds is coordinated by the Ministry of Business, Innovation and Employment.

For more information, visit [CURIOUSMINDS.NZ](https://www.curiousminds.nz)



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