

WESTEM SHOWCASE



2023 PROJECTS



TE HONONGA
AKORANGA
COMET



Ministry for
Pacific
Peoples

Te Manatū mō ngā hui ō te Moana-nui-ā-Kiwa

WESTEM SHOWCASE

2023 PROJECTS



TE HONONGA
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INTRODUCTION

Kia ora koutou! Welcome to the latest WeSTEM Project Showcase, in which we celebrate the incredible STEAM learning journeys some of west Auckland's tamariki and rangatahi undertook in 2023.


As the whakataukī below reminds us, the bird who relentlessly pursues knowledge unlocks the world's possibilities. Just like the miro berry nourishes a bird's flight, WeSTEM empowers young minds to soar through scientific and technological inquiry.

With WeSTEM, research isn't about finding definitive answers but rather about embracing curiosity, the joy of observation and the endless expansion of knowledge.

The six projects highlighted in this showcase demonstrate the importance of taking STEAM learning outdoors. Science doesn't solely take place in laboratories, so our rangatahi need to see that science is all around them.

We hope you are excited to read their stories. We can't wait to see what the future holds for these passionate young scientists!

Dr Sneh Patel
WeSTEM Project Manager
Te Hononga Akoranga COMET



***Ko te manu e kai i te
miro, nōna te ngahere.***

***Ko te manu e kai i te
mātauranga, nōna te ao katoa.***

**The bird who feeds on the
miro berry, theirs is the forest.
The bird who feeds on knowledge,
theirs is the world.**

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 STEM experts, to generate new scientific and/or technological outputs

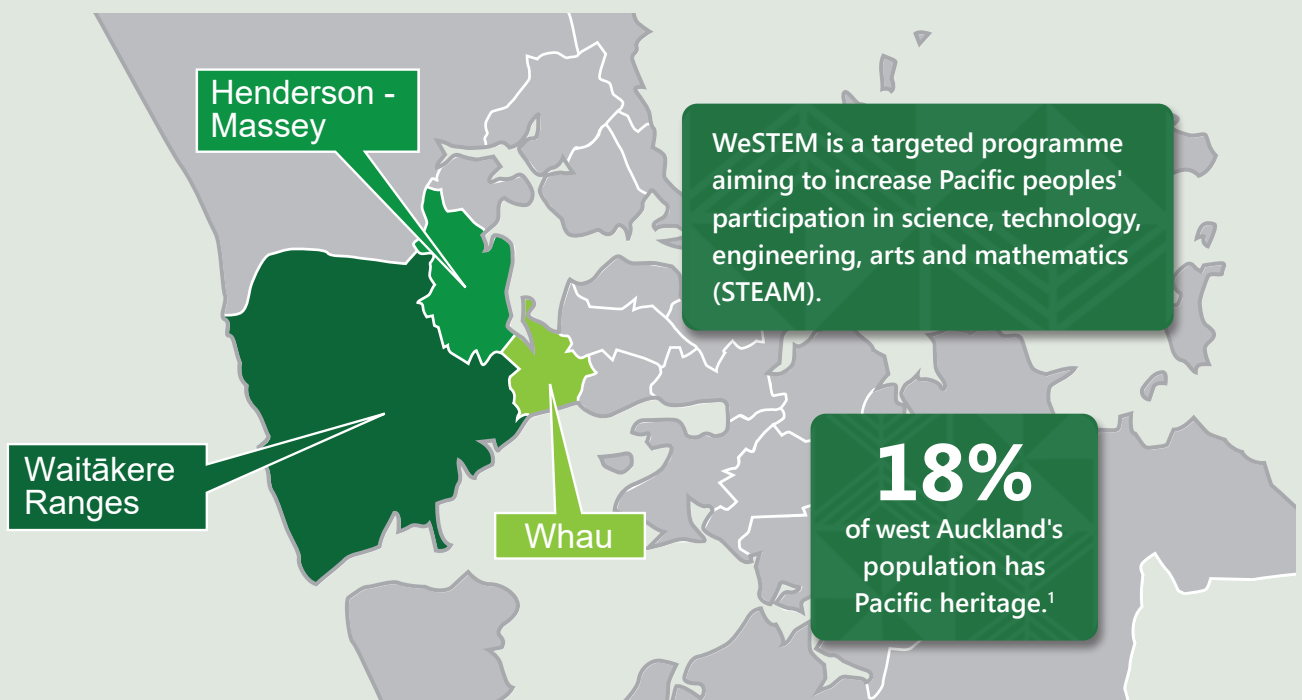


LOCALLY RELEVANT

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



ELIGIBLE FUNDING AREAS IN AUCKLAND:



¹Stats NZ Tatauranga Aotearoa (2024). 2018 Census.

PROJECT DATA (2023)



PROJECTS
FUNDED



\$54,467

DISTRIBUTED



SCHOOLS
INVOLVED



ORGANISATIONS
INVOLVED



YOUNG PEOPLE ENGAGED

32% OF WHOM IDENTIFY
AS PACIFIC PEOPLES

- 17.1%** SAMOAN
- 5.2%** FIJIAN
- 3.8%** OTHER PACIFIC
- 3.6%** TONGAN
- 1.8%** COOK IS. MĀORI
- 0.5%** TOKELAUAN





FUNGI FOR THE COMMUNITY

THE MUSHROOM SMITH

How can fungi provide for us and our community?

In an exploration of how fungi can provide for the community, west Auckland mycologist Chris Smith ignited a passion for mushrooms among 121 students from Waitākere College, St Dominic's Catholic College and Kelston Intermediate School.

The students studied the wonderful world of fungi and discovered there is more to it than just the mushrooms found at the supermarket. They also learnt about the different parts of a mushroom, from the cap to the mycelium, as well as the conditions fungi need to thrive.

Smith provided students with the tools to grow their own oyster mushrooms in class so they could investigate how different conditions can produce different amounts and sizes of mushrooms.

The students' exploration of fungi continued through regular walks around the school grounds. During these hiko, Smith taught the students how to identify wild fungi, and they came to understand the seasonal nature of different fungi types. The hiko proved to be a highlight, with the passionate rangatahi continuing

their newfound hobby during the school holidays, snapping photos of their encounters with fungi during their daily routines.

To fuel their curiosity further, Smith introduced the students to iNaturalist, a powerful online tool for identifying fungi. This tool proved invaluable, especially as Smith collaborated with the students to map the fungal landscapes of the Pacific Islands and compare them to the landscapes in Aotearoa NZ.

The goal of this project wasn't just to get the students excited about mushrooms but also to plant in them the seeds of curiosity, environmental awareness and community engagement.

As Smith explains, *"Being able to go out and explore our local environments and [see] that science can happen here and now was a hugely significant experience for many of the ākonga."*

By investigating something that is easy to find, grow and experiment with, Smith has empowered students to become active participants in understanding and nurturing the world around them.



I had the opportunity to learn a lot more about fungi and nature around Auckland and the Pacific region.

Year 10 student
St Dominic's Catholic College



Science and scientists are often viewed as strangers in far-off places that are unreachable and doing work that is unable to be understood. This project showed the students that meaningful science can be done locally and that it can even be done by them.

Chris Smith, project lead
The Mushroom Smith





TE WAIORA O TE AWA

MCLAREN PARK HENDERSON SOUTH (MPHS) COMMUNITY TRUST

How is the water quality of our local awa being affected by the recent floods?

During the summer of 2023, heavy rainfall caused flooding in many parts of Tāmaki Makaurau. To understand the flood's effects on their area, MPHS staff worked with 47 local tauira to investigate the health of the nearby Ōpanuku and Oratia streams.

In collaboration with freshwater scientists from Whitebait Connection, MPHS staff engaged local rangatahi through a series of workshops held during the school holidays.

During these workshops, the rangatahi explored various water quality assessment techniques and macroinvertebrate communities, learning how the presence (or absence) of sensitive species is an indicator of stream health.

The rangatahi also investigated how factors like temperature and oxygen levels can impact stream health. They collected water samples for eDNA analysis, which revealed the full biodiversity of the streams' respective environments.

This ongoing water quality testing project fostered community excitement and empowered participants,

with the initial cohort passing on their knowledge to newcomers at subsequent workshops, thus ensuring the longevity of the project.

The catching of two tuna (eels) at Ōpanuku Stream drew much interest, prompting the rangatahi to learn about healthy habitats and tuna migration habits.

The water quality testing segment wrapped up with a night-time spotlighting activity, during which the rangatahi and their whānau investigated their local stream after dark, when different creatures are active and visible.

MPHS staff plan to use the project's water quality results to inform the public and protect the ongoing work on Project Twin Streams in west Auckland.

One of the most significant outcomes from this work was a positive shift in the participants' attitudes toward their local streams. The rangatahi, along with their whānau, are now more committed to protecting the health and well-being of their streams, both for each other and for the many creatures living in them.



" I really enjoyed it. Normally I hate going out and [fear] bugs and rodents. Now I appreciate the work involved to keep our streams clean and how it affects our community.

Participant





MEASURING MAURI – WETLANDS AND WATER

MATUKU LINK + HENDERSON NORTH SCHOOL

How do changes to wetlands and streams affect humans and how do we monitor this?

This project involved 190 students from Henderson North School exploring the vital role of wetlands in our environment. Their investigations equipped them with knowledge, and they gained an appreciation for these crucial ecosystems, particularly around the role they play in mitigating the effects of flooding.

Matuku Link educators and Henderson North teachers kicked off the project with a classroom workshop designed to spark a passion for wetland conservation in the participants.

Through activities like identifying native plants, building pest traps and looking at stormwater models, the students grasped the role of wetlands as natural flood buffers and vibrant ecological hubs.

A field trip to the Matuku Link wetlands near Bethells Beach on Auckland's wild west coast brought the students' classroom learning to life.

Guided by the Matuku Link educators, the students observed local flora and fauna and witnessed how wetlands collect and slow floodwaters, protecting nearby communities.

By engaging with the wetland ecosystem firsthand, the students gained a deeper understanding of its valuable functions.

The students also delved into water quality testing. Identifying macroinvertebrates as health indicators, they learned how community action protects sensitive species and prevents pollution from entering their local waterways.

This project succeeded in sparking a passion for environmental stewardship within the students. Through hands-on interaction with a real-world ecosystem, the project empowered them to become guardians of our irreplaceable wetlands.

According to lead educator Leah Neilsen, "*Following the Auckland floods in 2023, this [project] helped participants feel less helpless and [understand] that there are things we can do to minimise flood damage.*"

The students' newfound appreciation for wetlands will no doubt shape their actions and inspire future generations to protect these critical assets.



“ *This project has helped to change many people’s attitudes around water and wetlands, from thinking of water as being dangerous and flooding being a scary thing ... to understanding how wetlands can mitigate flood effects by slowing and filtering water.*

Leah Neilsen, lead educator
Matuku Link





ADOPT AN ECOSYSTEM

SOSAIETE AOGA AMATA SAMOA I AOTEAROA INCORPORATED (SAASIA) –
TAULAPAPA LEATA SU'A AOGA AMATA & ROSEBANK EARLY CHILDHOOD CENTRE

How do we create and sustain an ecosystem?

Looking at how things grow proved to be an engaging gateway into science for our youngest learners. Supported by SAASIA educators, 57 tamaiti from two west Auckland ECEs undertook a guided inquiry into how ecosystems operate and the crucial conditions they need to thrive.

The project began with the tamaiti setting up terrariums in their classrooms as a foundation for learning about the biological processes that take place inside an ecosystem.

As part of this process, the children learnt that plants need air and water just like they do. By relating the plants' needs to their own, the tamaiti learnt the importance of caring for plants to ensure they survive and thrive.

The next phase of the project saw the tamaiti venture outdoors, where they could apply their learning from the terrariums in an outdoor garden set up with flowers, fruits and vegetables. This garden work — complemented by a series of field trips — allowed the

children to explore the differences between a closed terrarium and an open garden.

Discovering that all plants require the same basic necessities regardless of their environment, the young scientists diligently watered their plants and monitored light levels to ensure their plants received adequate nourishment.

The tamaiti also learnt to prune their plants and harvest their produce carefully so the plants would continue to grow and provide food in future seasons.

A key feature of this project was the high engagement from fanau, who readily shared their wisdom and helped set up the outdoor garden.

For SAASIA, this collaboration with fanau was crucial, as it meant the tamaiti could continue their learning outside the classroom, strengthening their bond with their local environments and empowering them to become future environmental stewards.





TE MOHIO KI REIRA KO RUTHERFORD COLLEGE

RUTHERFORD COLLEGE

How can new technology be used to improve students' understanding of Rutherford College, its place and its people?

This project saw 22 rangatahi from Rutherford College collaborating with University of Auckland researchers to explore how innovative technologies can be used to improve their school community and local experiences of being 'Te Atatū proud'.

Te Pūnaha Matatini, through its Tika Māori and Pacific (TMAP) initiative, supported four Year 13 students to conduct a research internship exploring the uses of a 360° camera to create virtual reality experiences. The interns engaged their peers by encouraging them to find various applications for the camera technology.

In the first phase, the interns used the camera to map the school grounds, from the entrance to the back fields, to create a video aimed at reducing anxiety among new students, who may feel unsure about moving to a high school environment. This footage will be accessible to all new students, including those from nearby Te Atatū Intermediate School.

Moving forward, the TMAP interns partnered with University of Auckland engineering students Nicholas

Patel and Ryo Kamata to leverage the 360° camera for automated bird monitoring at Harbour View Beach Reserve. This "set-and-forget" approach tackled the time-consuming nature of bird monitoring, while machine learning developed by Nicholas and Ryo streamlined bird counting and identification.

This project embraced a tuakana-teina approach, with both the graduating students creating a lasting legacy for their younger peers and the university students sharing their knowledge with the interns. For project lead Annette Goulding, the project's success was in connecting students who wouldn't normally interact, thus fostering friendship and collegiality.

Capping off the project, the TMAP interns joined the school's enviro-group on a trip to Tiritiri Matangi to learn about island pest control.

Armed with their new learning and bird monitoring skills, the enviro-group students will embark on a wider community project to tackle Te Atatū Peninsula's predator problem and restore native wildlife.

" *[This project] has definitely given me a much bigger love for the sciences. For example, biology: this has really opened my eyes to what biology can do to help our world right now.*

Kiedus Paulo, Year 13 student
Rutherford College

"



Watch '*Demystifying Rutherford College*'



Watch '*Exploring Rutherford College's Environment*'



LICHENS AS BIO-INDICATORS OF AIR QUALITY

GREEN BAY HIGH SCHOOL

Can we use lichen to identify patterns of pollution?

Six rangatahi from Green Bay High School continued an investigation into using lichens to monitor air quality, a project their science teacher, Dr Angelo Tedoldi, began at Avondale College in 2022.

Immersing themselves in the scientific process, the students researched lichens, identifying various local types and learning how to collect samples for analysis.

The students then travelled to Ōtepoti Dunedin, where they collected more lichen samples and met with GNS Science geologist Dr Adam Martin, who taught the students the principles of X-Ray Fluorescence Spectrometry. They also worked with Dr David Warren, a chemistry professor at the University of Otago, to conduct thin-layer chromatography experiments.

According to Dr Tedoldi, it was important for the students to *"analyse lichens from different areas and see how different places can have different lichen species and heavy metal concentrations."*

Equally important was the opportunity for the rangatahi to experience the process of designing

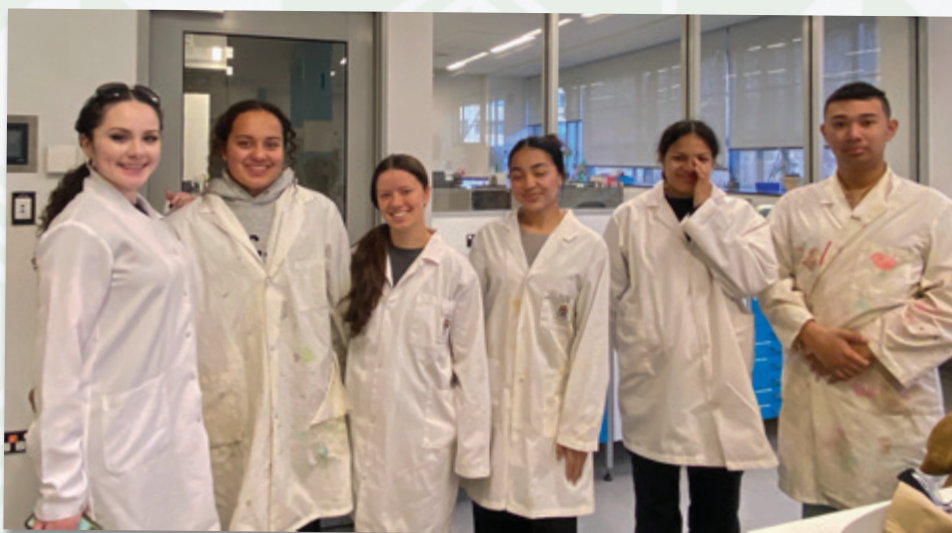
a science experiment, including collecting and analysing specimens, gathering the data, and then presenting the results to peers.

One result was that lichens from areas with high vehicle activity contained elevated levels of cadmium, which suggested that the plants were absorbing this common petrol additive.

Interestingly, despite having been phased out of petrol nearly two decades ago, significant amounts of lead were still detected in the lichens. This discovery highlighted the unique role lichens play as air quality archives capable of storing chemical information long after absorbing it.

Moving forward, Dr. Tedoldi is keen to expand on this mahi. He plans to make the findings more accessible to the community, ideally through a broader citizen science project to deepen public understanding.

Dr Tedoldi also intends to incorporate the project into his classroom teaching. As part of this, he would like his current students to take on a leadership role and share their learnings with their peers.



" We were lucky to collaborate with amazing science partners [who know] how to engage students early in their school career so we [can] have more Pasifika students doing science at tertiary level.

Dr Angelo Tedoldi, project lead
Green Bay High School



EXPANDING STEM HORIZONS THROUGH PARTICIPATORY SCIENCE

Launched in 2021, WeSTEM seeks to ignite a passion for STEAM in young Pacific people by actively involving them in the scientific process to address an issue that is relevant to their community.

From understanding the problem to meticulously collecting data, analysing results, building prototypes and sharing their findings, WeSTEM participants gain invaluable hands-on experience.

WeSTEM aims to change the narrative around what it means to be a scientist. Although 8% of Aotearoa New Zealand's population identifies as being of Pacific descent, Pacific peoples make up only 2% of the STEM workforce.²

WeSTEM Project Manager, Dr. Sneh Patel, firmly believes this stark contrast doesn't reflect a lack of ability but rather a lack of opportunity. "Pacific Peoples possess a wealth of untapped potential," she emphasises. "Their ancestors navigated vast oceans using remarkable

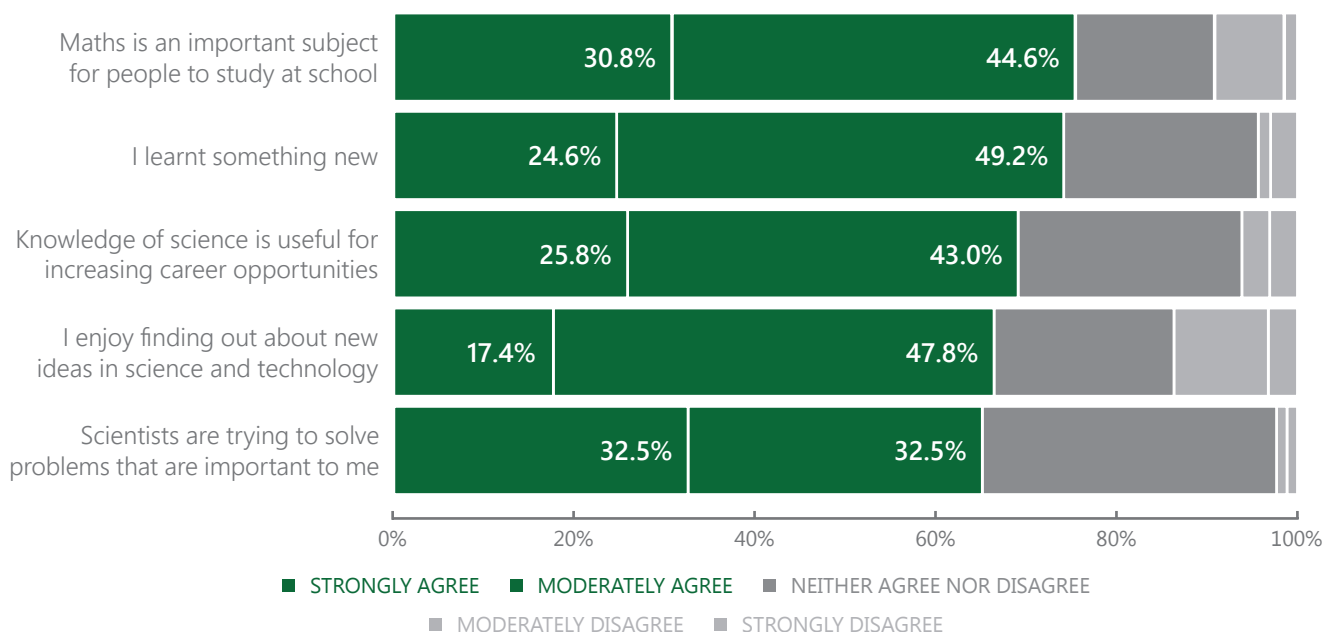
scientific knowledge and innovation. By reviving these forgotten narratives and showcasing the possibilities ahead, WeSTEM helps young Pacific people envision a world where they can thrive in STEAM fields."

Te Atatū Intermediate School teacher, Tony Nemaia, values the authentic learning that WeSTEM facilitates. He has been involved with several WeSTEM projects since 2022, all of which have enabled students to work alongside real STEAM role models from AUT and the University of Auckland.

This collaboration allowed the students to experience how science is everywhere and can be done by anyone, connecting the work they engaged in at school with the work scientists do in their day-to-day jobs.

"When you allow students to sit in a real space, in something they can actually genuinely work in, it's more of a legacy piece," reports Nemaia.

Here's what our student participants had to say about their WeSTEM project experiences:



The connections between students, their communities and STEAM experts are crucial to the success of any participatory science project.

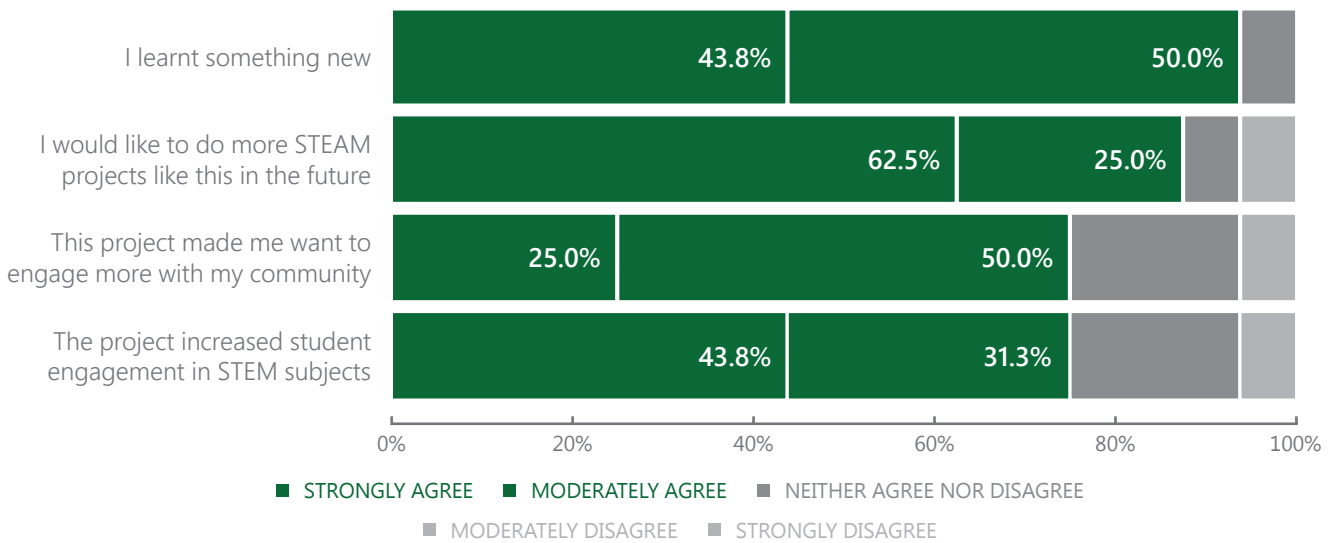
For Pacific students, service to family and community is highly valued. Being able to showcase their STEAM learning and understanding of how science can benefit their communities is a rewarding experience for them.

The benefits extend beyond students, impacting teachers and STEAM experts as well. Associate Professor Michael

O'Sullivan from the University of Auckland finds the connection with community to be invaluable; it's one of the most exciting things with which he has been involved during his time at the university.

"It's inspiring to understand the power of getting out into [schools and communities], making those connections and seeing what wonderful opportunities there are that you don't get if you just stay at university," reports Associate Professor O'Sullivan.

Here's what teachers and STEM experts had to say about their WeSTEM project experiences:



" If we [want] to have true innovation [and] solve some of the hard problems of the world — such as climate change — it needs to come from lots of different perspectives.

Associate Professor Michael O'Sullivan
 University of Auckland
 worked with Rutherford College (see page 14)

8% of Aotearoa NZ's population identifies as being of Pacific descent.
 Yet Pacific peoples make up only **2%** of our STEM workforce.²



Participatory science offers a unique opportunity for schools, communities, universities and businesses to collaborate on meaningful projects that shift students' attitudes towards STEAM and expand their vision of what is possible.

Are you keen to support more Pacific students to see pathways into STEAM? Contact the team at Te Hononga Akoranga COMET to discuss future opportunities: stem@cometauckland.org.nz

² Stats NZ Tātauranga Aotearoa (2020). 2018 Census.

STEM ALLIANCE AOTEAROA

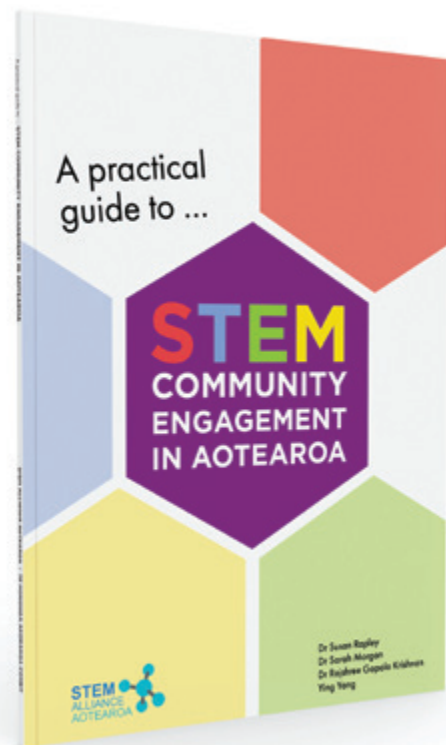
The WeSTEM participatory science platform has consistently shown the value of community and science partnerships for creating engaging opportunities for students to explore science, technology, engineering, maths and mātauranga in real-world contexts.

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, an initiative of Te Hononga Akoranga COMET, 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 it takes effort to make community outreach and engagement initiatives work. *A Practical Guide to STEM Community Engagement in Aotearoa* is an easy-to-use, research-based response to this challenge.

To find out more, visit www.stemalliance.org.nz



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 here:



WESTEM

Te Hononga Akoranga COMET is an independent charitable trust 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.

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