



Working with scientists

Many schools try to find a connection with scientists for their students. NZASE Science Communicator Mike Stone spoke with six teachers, two scientists and two providers of Learning Experiences Outside the Classroom (LEOTC) to find out more about how to do this.

More and more teachers are finding that working with scientists or science experts can add an extra dimension to students' learning, by setting it in real contexts of genuine relevance to the community. What better way to explore NoS and understand how science and scientists work? There are many ways school students can engage with scientists.

Projects with Curious Minds funding

Curious Minds can provide up to \$20,000 for school and community projects involving scientists. [Comet in South Auckland](#), [Venture Taranaki](#), and [Otago Science Into Action](#) help schools in their regions develop projects and find scientists.

Nicole Stevens, responsible for the Health Science Academy (HSA) at Auckland's **Manurewa High School**, involved her students in the [Tiaki program](#). They had to pick an environmental issue, work with a scientist, and present their work at a community expo.

This was a short project, with little time commitment but was amazing for her students. "Winning gave the kids mana, they held their heads up high."

The HSA also worked with Dr Stanley Bellgard from Landcare Research to look at mould in homes. For this project Nick came to school and the kids went to Landcare, both involving hands-on activities.

The students developed an extractor fan.

"I went to kitchen design places to find a CAD designer to work with the kids." And Nicole also developed an assessment task (for AS 90925) so the students could earn some credit for their work.

Thierry Lints, a genomics scientist with the University of Auckland, worked with several schools using DNA sequencing technology to assess the microbial populations in the Ōmaru awa in Te Tai Tokerau. Thierry worked with the teachers and Dr Jannie van Hees (a literacy expert) to develop an in-class program of activities learning about classification, adaptations, cells, microscopy and DNA.

Two PhD students, Olivia Mosley and Emilie Gios, worked with students sampling water from the local stream feeding into the Tāmaki estuary – the organisms were sent to the lab for DNA sequencing. Some samples were plated onto agar and sent to the lab for incubation.

They found 98% of the DNA was from bacteria (including coliforms) and viruses, with the other 2% from eukaryotes – mostly human, but also eel, duck, dog, sparrow, and willow and other riverbank plants.

Kiriwai Tapuke was one of five Year 7/8 teachers at Auckland's

Renew students in Te Tai Tokerau begin their stream study. Photo: Gwen Owens.

Manurewa High School won second place in the senior Tiaki competition with their project on algae farming to create a biofuel. Photo: Nicole Stevens.



Point England School involved in the project. “I remember the first lesson where we had this massive poster of the tree of life with pictures of living things and students had to figure out which branch they belonged to.”

The students were “engaged in a great hands-on activity and lots of interesting discussion.” The teachers had to work hard, learning the content and then using activities to teach it to their students. “Thierry and Jannie held our hands to unpack the trickier concepts and we learnt from each other too. It was full-on but really worthwhile.”

Merel Kroonenberg, HoF at Auckland’s **Otahuhu College**, used CM funding to undertake a term-long investigation into the water quality at a local park. Scientists at the University of Auckland and Watercare worked with students at school and onsite. Watercare provided the equipment to test water, taught the students how to use it, analyse the results, and log the data onto the Waicare website.

Teachers’ own connections

The airforce’s Schools 2 Skies program brought a training plane to Kowhai Intermediate School. Photo: Jude Hancock.

Ceri Blears-Woodcock teaches Earth and Space Science (ESS) at **Otūmoetai College** in Tauranga. She has asked several scientists (eg, from NIWA and GNS) to talk with her class – some face-to-face, most online. In preparation for such a talk students research by reading articles (scientists often send through material), watching excerpts from documentaries and on the internet. Through class discussions, questions are co-constructed and displayed on the board.



Students categorising a bottom dredge sample on NZMSC’s research vessel, RV Beryl Brewin. A teacher said: “We have been so impressed with the quality of the teaching staff and mentors - they have been fantastic inspiring role models for our young scientists of the future.”

GNS scientist Cornel de Ronde enjoyed talking with Ceri’s students in class and answering their questions. “Ceri gave me free reign – I talked about how I got to be a scientist and what my working day was like. Open forum like that works well for me.” He also appreciated her emailing him afterwards to say thank you and pass on student comments.

However, while CRIs expect their scientists to connect with schools they are given no time allowance for this outreach, and still have to meet work deadlines. So most scientists do it from the goodness of their hearts.

At **Renew School** in Whangārei, HoD Gwen Owen’s students are involved with the [Tiakina Predator Free project](#) and [Whitebait Connections](#). She had her mother’s cardiologist come to school for the day, talking with juniors about the heart, and with seniors about waves. She also has a radiographer coming in next term.

Jude Hancock leads the science program at Auckland’s **Kowhai Intermediate**. In 2017 she was on the [Science Teacher Leadership Program](#) (STLP), hosted by the Astrobiology department in the University of Auckland (UoA) School of Environment. “Over those six months I learnt the power of networking as I connected with other scientists at the uni. Now I just ask scientists and if they say no, it is no big deal.”

She has worked with scientists from UoA to develop some lessons on rocks. “We developed a rock key together, finding appropriate language for 12-year-olds. At the end, the team left the rock samples with us for two



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weeks so we could keep using them.”

She has experts from the astronomical society coming in soon with a Newtonian telescope, and a colleague is working with other scientists on a CM-funded project investigating rubbish from gutters that ends up in stormwater.

LEOTC providers

The University of Otago’s **NZ Marine Studies Centre** (NZMSC) on Dunedin Harbour has been working with schools for at least 30 years. They are one of many providing Learning Experiences Outside the Classroom. Here students work with scientists and science experts in the laboratory, on the seashore, or at sea on the research vessel. For example, Year 13 Biology students carry out 3-day investigations on the behavioural response of crabs and other intertidal species to different environmental conditions.

Year 13 Earth and Space Science students also visit to investigate the impact of ocean acidification on marine species. The NZMSC has many resources online to help teachers and students learn about the coastal environment and develop their science skills, most in English and some also in te reo Māori.

LEARNZ, another LEOTC provider, offers virtual field trips two or three times a term. Students can work with DoC, go underwater or inside caves or glaciers, see Māori rock art, find out about careers, spend the day with a geologist, go on expeditions to Raoul Island, Antarctica – all involving interaction with an expert in science or Mātauranga Māori.

Schools can enrol to participate and can ask experts questions live (secondary classes too, with notice), or watch the uploaded videos later. Whole units are wrapped around each field trip – resources that can be used

before and after the event, including readings (with a narration option), images, keywords, questions to think about, and quizzes.

Benefits

The teachers and scientists all identified benefits.

What do students get out of it? Nicole said “82% of our students are Māori or Pasifika with few whanau in roles that use a lot of science. Meeting scientists allows them to see themselves in those shoes. Kids get so much out of seeing real scientists. I get a real sense of satisfaction too, seeing these experts being prepared to help my kids.”

Ceri looked for scientists who could enrich the learning, focussing on gaps in student knowledge and giving them evidence to use for assessments. She said “Students see their teachers learning with them, not being the fount of all knowledge. They learn a bit about science in the real world. And it is motivating, a different way to engage them.”

For Jude, the “purpose is not content, it’s about student engagement, curiosity and careers.” Merel’s students shared what they had learned with local primary students.

Research shows that teachers who engage

During a recent LEARNZ virtual seaweed trip, schools put questions to Rob Major, a marine ecologist at Cawthron Institute. Learning material from this trip stays online for teachers to use.

Ngā Kupu

Ataata – Video

Awa – River, stream

Huanga – Benefit

Kaipūtaiao – Scientist

Kukuwhatanga – Evolution

Mōhio – Expert, knowledge, wisdom

Tipako (~na) – Sample, sampling

Umanga – Career, occupation

Whakatika – Prepare.

From Te Ara Dictionary and Peekupu



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with scientists increase their understanding of science knowledge and processes, and keep themselves up to date. They can gain access to environments that are out of the reach of most schools. They can see the value of applications as important vehicles for students to learn content and to expand their horizons¹.

Ceri says “scientists clarify my misconceptions, and they supplement texts, which are limited for ESS and get out of date quickly”. She finds her relationship with the students benefits because they appreciate her taking the time to find these scientists for them. Jude says “I feel like I am succeeding when I get students to talk with scientists.”

Scientists themselves benefit too. They become aware of the complexities of teaching and learning environments, and can improve their communication skills. And they often find it personally rewarding developing the next generation of scientists. Thierry also mentioned the benefit of encouraging more Māori and Pasifika into health science professions.

Teacher advice

The teachers also had helpful suggestions for those wanting to work with scientists.

Start small: Jude suggests beginning with [Skype a Scientist](#) as the structure is all there and it is easy. Nicole suggests starting by bringing a scientist in to help judge a science fair or a competition.

Look for scientists: Nicole says: “I read newsletters and Facebook posts and put my hand up for anything that looks interesting to kids.” Ceri saw scientists in the news and in YouTube videos. She contacted their organisation and they put her in touch with the scientist, although this took up to three weeks.

Gwen “lives in a small community, so I just keep my eyes and ears open and use contacts of family and friends and word of mouth; locally, Shirley Patterson at Enviroschools is a useful contact”. Some ask teaching colleagues (many have contacts at uni or in industry).

Prep together: Several teachers discussed the importance of talking with the scientist about what the students liked and their knowledge gaps, to help scientist pitch it at the right



University of Auckland PhD students Emilie Glos (left) and Olivia Mosley set up a pump attached to a car battery to filter local stream water through a 0.2 µm mesh to collect organisms, talking with Tamaki Primary School students who took the water samples.

level. Some also found it helpful to suggest using visuals, asking students questions, and keeping the language at an appropriate level.

On the day, as with any visitors, teachers put the agreed questions on the board, ensure there are no headphones, phones or gum-chewing, and discuss courtesy. Allow plenty of time to plan and organise the interaction, as all teachers said it takes longer than you expect. Beware the interruptions of terms 1 and 4.

Conclusion

There are many ways that students and science experts can engage. It may be one-off events or ongoing projects, online or face-to-face. STLP and the [Science Learning Hub](#) are useful, as are LEOTC providers.

Effective working relationships between scientists and teachers harness their complementary strengths¹. Scientists know their field in some depth. Teachers know their students and how best to teach them. Collaborative planning allows each to draw on the other’s strengths to best effect.

Working with scientists can help enact the vision of the NZC – confident, connected, actively involved, lifelong learners.

Source & reference

¹ Bolstad, R., Bull, A., Carson, S., Gilbert, J., MacIntyre, B., & Spiller, L. (2013). [Strengthening engagements between schools and the science community](#). Wellington: NZCER.

[Thierry Lints](#) has developed a senior biology genomics resource for use with AS91602. This will be available later in the year (~term 3) after it is trialled by schools.



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