NZASE resource

Primary science leaders

Becoming a science leader in a primary school can be a daunting prospect – it's all very well being capable and passionate about teaching science, but how do you lead others who may lack confidence? These seven teachers, experienced in the role, talk about how they made science 'hum' in their school, whether it was taught every week, several times a term or only one term a year.

Sandy Jackson, in her role as NZASE primary representative, says that before accepting a science leader role it's important to determine whether the school leaders see science learning as a priority. Without their leadership and backing it is very difficult to make traction. "I'm lucky at my school, our leaders believe science is important but it is not the same in all primary schools."

Support for science leaders

There are two key organisations providing Professional Learning and Development (PLD) in science, and both of these focus on the Nature of Science and building teacher confidence. They can help science leaders find their feet.

The Royal Society's Science Teacher Leadership Programme (STLP) funds primary and secondary teachers for two terms out of school, hosted by a science organisation and participating in PLD on science and leadership. For the next 18 months these teachers are supported to improve science teaching back in their school, with resources, funding for release time, and mentors.

The Sir Paul Callaghan Science Academy (SPCSA) is an intensive PLD programme for teachers of years 1-8, running over four days in the school holidays – in Hamilton in July 2022, and Christchurch in October. The academy is free, but schools need to provide accommodation, travel, and meals.

Both experiences provide a network of alumni who support each other. Many of the teachers we interviewed had been to one or the other and spoke very highly of the experience.

Getting started

The science leader role is to support teachers to implement the science programme. They provide resources, PLD and curriculum guidance. In some cases they do all the Science teaching for the school.

When first in the job it is time to take stock – what do you already have that is working, where are the gaps, what barriers need to be addressed? What do the staff and students know, what do they need to know? Analysis of this data can give some direction to the role.

Surveys of students, staff and parents/whānau can be useful. The 2021 ERO report provides ideas for useful questions. The STLP course also provides tools. Some schools do a survey every year.

Keeping it simple - static electricity at Queenstown School. Photo: Julie Little.

Sarah Ridgway of Ladbrooks School found that "many students thought science was for someone who works in a lab. So we have made sure our programme includes a variety of experiences to help students see science in the world around them."

Jude Hancock, science leader at Kowhai Intermediate, says, "At the start we had a big resource pool but it was a mess. I got a week of release time to sort it out. I threw out what was no longer useful, found out where the gaps were and sorted out what we needed to purchase. The principal was willing to give science a healthy budget."

Josh Burrowes says, "Gladstone Primary is part of a Kahui Ako, so I worked with the Cross School Lead, Matt Huang, to look at what is needed for year 9 and 10 science, developing learning outcomes that students needed to meet by the end of primary school. Then we focussed on two or three each year, so that over a student's time at primary school they would cover them all. Matt's curriculum advice has been invaluable."

It is helpful to build a team around you, although this can be a slow process. When approached, some teachers may say "you're getting paid, not me," but Jude Hancock suggests getting them to look at the big picture. Being part of a team means they will learn how to better teach science and they will find it easier to plan science lessons.

At Edendale Primary, Latha Nayagam leads a science team which includes a teacher from every team in the school, as well as a senior leader.

Building teacher confidence

"Most primary teachers have little experience of science and do little at teachers college. Teachers don't want to get it wrong, so it's easier to avoid," says Josh. So how can science leaders build confidence?

Several teachers said that a focus on Nature of Science strands of the curriculum and the Science Capabilities makes teaching science less daunting, because the content is less prominent. Teachers can help students develop skills such as observation and inference, gathering and interpreting data.

When Jude Hancock started in the leader role, confidence was a huge issue. "Teachers were finding others to teach science to their class, they pawned it off." For each science topic, Jude now provides a selection of teaching ideas and resources, with instructions and gear for practicals. Then before the topic starts, teachers meet in the hall after school for PLD, working in groups to try the practicals and ask questions. Those still finding it difficult are welcome to talk things through with her.

Josh has found that teachers gain confidence by hands-on experiences – in PLD led by him, or by teachers from the high school in their Kahui Ako, and by an external provider (regionally allocated).

Sandy Jackson, at Kings School, has found that teachers gain confidence when others go through the practical with them – what to do, tips for success, questions to ask students, and how to deal with poor results.

Sarah Ridgway says, "I run PLD, the same sort of PLD we had in the STLP programme – wee snapshots of teaching examples, such

Above: Hands-on creatures at Gladstone School. Left: An Edendale student suited up for the Space Day in 2021. Photo: Mike Stone.

Ladbrooks students Poppy and Phoebe learning about making observations and inferences using dry ice. Photo: Sarah Ridgway.

as how to teach observation skills. I would take the staff through the lesson as if they were the students. Then provide them with the materials so they could lead such a lesson with their students."

Rose Keegan of Newtown Central School says that the Building Science Concepts series (right) is also useful for building confidence, because they "explain the big ideas teachers need to know and suggest an approach to the topic".

Sarah Ridgway found Constructing Your Primary School's Science Curriculum by Bull, Joyce and Hipkins very useful for PLD sessions.

Latha Nayagam says her school is moving away from pen and paper assessments, and this also helps with teacher confidence. Students work in groups and show their science learning to parents and at open day.

Practical resources

Practical activities are the beating heart of science. Science leaders need to ensure that teachers have the resources they need to run practicals. A list of possible equipment is available from NZAPSE.

Sarah's school has invested in House of Science (HoS) this term to help build teacher confidence. The school pays a subscription to this 'library of science kits', borrowing one big box each fortnight and receiving ongoing PLD. Each kit provides a teacher manual, equipment and bilingual instructions for at least five hands-on experiments. With a booking system, the kit can be in use almost every period of the week.

Other schools make up their own practical activity kits for teachers to book out.

Kowhai Intermediate has a science room which teachers book into period by period. Lab monitors from a senior class regularly top up the consumables and ensure everything is ready for each booked lesson.

Julie Little also has a science classroom and a budget of $1,000/yr, mostly for consumables. She borrows kits of resources on light, electricity and rocks from the Central Otago Resource Centre.

If a science leader needs support for a new initiative, Jude Hancock says it's helpful to talk to other schools about it first. Research carefully, presenting the senior leaders with data, sound reasoning and a justified budget. She says "Our Kahui Ako was prepared to pay for an expensive model of the circulatory system that all its schools can use."

Integration

Science is also good for building literacy and numeracy skills, and can be integrated into many other subjects. Teachers often need help with this, so one-on-one support from the science leader can be invaluable.

Josh uses both readings and the activities (e.g., from HoS kits) as a stimulus for creative writing prompts – poetry, descriptive writing, moment-in-time and explanation writing.

If the school has a specialist science teacher who takes all classes for lessons, other teachers can see this as absolving them of any responsibility to teach the subject. It is important to keep science at the forefront of their minds, modelling suitable activities in staff meetings, and showing how relevant events can be used to bring in science.

Linking to Mātauranga Māori

Many science leaders found this a challenge.

Sarah Ridgway said, "This has been a staff focus for us as the initial review identified a need for more support. We always have visited the marae every second year as a school, but now understand how to better use this

experience and the strong link the stories have with science."

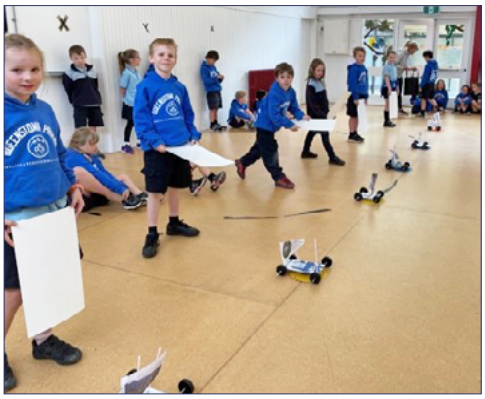
"The Enviro Schools programme also helps us to link to groups and knowledge in the area. On STLP I was hosted by ECan, who had just employed a Mātauranga Putaiao expert to help provide links for the scientists. She has just run an outreach programme and is helping me set one up at school."

A last word of advice

All seven of these science leaders talked about the importance of making connections with other primary Science Leaders in nearby schools, in the Kahui Ako, at local Science Teacher Association events, and on Facebook groups. One teacher called it "building your own community". They also suggest signing up to newsletter mail lists too, such as NZAPSE, NZASE, and PSTT in the UK.

Useful resources and experiences

A science leader's role is to "keenly advocate science in every way you can," says Jude. These sorts of experiences can be helpful: Science Roadshow; Science in a Van; Hands On Creatures; EPro8 Challenge; and Science Badges.



Students racing the cars they made at a lunchtime Science Competition run by the Queenstown School Science club. Photo: Julie Little.

Below: Queenstown School juniors making an animal fridge magnet that lights up with LEDs in an electricity unit. Photo: Julie Little.

Second from bottom: Mt Albert Grammar boy Jamie Drever launches a compressed air rocket for Edendale students at their Space Day. Photo: Mike Stone.

Bottom: Senior Ladbrooks students working on a task in the HoS kit using evidence to identify fish. Photo: Sarah Ridgway.

Ngā Kupu

Hīkaro – To infer, inference
Kohikohi raraunga – Data collection
Pātai – Question
Tātari raraunga – Data analysis
Tatauranga – Survey
Taiwhanga pūtaiao – Science lab
Tūhuratanga ā-ringa – Practical investigation
Whakamātau – Experiment, test, trial
Whakatātare – To scrutinise, observation

Te Aka Maori Dictionary and Paekupu