



Science in New Zealand schools and early childhood services

Science is important – we rely on science and scientific thinking in almost every endeavour in our modern society. High quality science education at school is essential for learners who want a career in science, but it is also important for all learners to help them understand the scientific issues that whānau, communities, and nations face. Issues such as climate change, healthy living, and innovation all depend on science.

Critical to science education is the quality of teaching of science in schools, and the engagement of students with science.

ERO is concerned that recent national and international reports show that New Zealand students in Years 5 to 11 are not achieving as well in science as we would like. It also shows students become less engaged in science over time, and fewer 15-year olds see value in science, compared with international peers.

To address these issues, we need to understand how schools and early childhood services can strengthen their science teaching and learning in New Zealand. ERO has explored this in early childhood services and schools across the country.

What impacts on science teaching and learning?

To help services and schools understand what needs to be done to support improved outcomes in science, ERO has published three reports:

- *Science in the Early Years: Early Childhood and Years 1-4*
- *Shining a Light on Science: Good Practice in Early Childhood Services*
- *Growing Curiosity: Teaching Strategies to Engage Years 5 to 11 Students in Science.*

These reports identify where schools and services are doing well, and highlight how schools and services could increase the impact of their science teaching and learning.

Science in the Early Years: Early Childhood and Years 1-4

There is very little information about the quality of teaching and learning in science in the early years. To help fill this gap, ERO took a deeper look at what was happening for learners in this age group.

We focused on three key components in this evaluation:

- leadership for science teaching and learning
- intentional teaching that supports children to develop the knowledge,

skills, dispositions and working theories that serve as the foundation for ongoing learning in science

- a responsive curriculum for science, that builds on children’s knowledge, interests, languages, cultures, and needs.

We found elements of good practice.

For example:

- kaiako and teachers provided interesting contexts for children’s learning
- kaiako and teachers made connections with children’s prior knowledge.

We also found areas that could be strengthened to improve children’s opportunities for learning in science:

- kaiako and teachers could plan more for children’s learning and progress in science, rather than for discrete science activities
- many kaiako and teachers could make better use of assessment to describe and understand children’s learning, and inform next steps for their learning
- service and school leaders could also consider more how well their science learning programmes support children to progress in science.

The report includes questions to help leaders reflect on the science learning provided in their school or service.

Shining a Light on Science: Good Practice in Early Childhood Services

To support science in the early years, ERO identified eight early childhood services that demonstrated good practice in science teaching and learning. This *Good Practice* report provides examples of:

- leadership that encourages collaboration and improvement, for example by sharing professional readings and guidance with kaiako to build their understanding of science in a play-based curriculum
- kaiako who are deliberate in their approach to supporting children, for example by building on children’s interests, and encouraging them to design experiments, and deepen their thinking

- bicultural practice, for example by supporting children to reflect the values of kaitiakitanga, rangatiratanga, and manaakitanga as they explored the world around them
- learner-focused partnerships with parents, whānau, and the community, for example by giving parents and whānau ideas for how to further support their children’s scientific interests at home.

The report also gives examples for how leaders can do effective internal evaluation focused on how well they provide rich and responsive science curriculum.

Growing Curiosity: Teaching Strategies to Engage Years 5 to 11 Students in Science

Previous ERO evaluations of science for the Years 5 to 11 age group identified a need for a greater focus on teaching the integrating strands of the science curriculum, and how many teachers found it difficult to maintain the integrity of science when integrating it into their teaching.

To support teachers to do this, this report sets out the strategies and approaches that a selection of schools had taken to increase students’ engagement in science. Across these schools, ERO found the key influences that contributed to improved outcomes in science were:

In primary schools

- **A planned approach to strengthen students’ engagement in science.** For example, teachers in the case study schools recognised the importance of moving away from programmes focused on science knowledge, and instead focused on engaging students in meaningful learning. They planned and implemented changes in a manageable and well supported way.
- **Targeting external and in-school professional learning and development.** This motivated teachers to try new things, and to share their learning with their colleagues.

- **Increasing the breadth of science experiences offered**, for example by extending the variety of resources they used, or engaging experts from the community to share their knowledge.
- **Collecting and using a variety of information for planning and evaluation**, such as surveys of parents and teachers, and assessment tools to help understand students' learning.

In secondary schools

- **Reviewing science programmes across all year levels**, with the aim of encouraging more students to continue with science in the senior school. Teachers and leaders in case study schools considered the content and coherence of the science programmes they offered, and the extent of the opportunities for students to become critical and creative thinkers.
- **Refocusing on the *Nature of Science***, for example by challenging students' assumptions, asking questions, inviting predictions, and introducing students to relevant scientific investigations.
- **Carefully structuring the development of skills and knowledge**, for example by revising concepts covered in previous years, before introducing a more complex investigation, or giving students a certain amount of basic information before undertaking independent or group investigations.

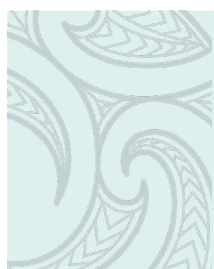
- **Responding to learners' interests, strengths, and needs.** Teachers in case study schools asked students to suggest contexts to use when investigating particular science concepts, and developed partnerships with science-focused organisations and community groups to extend students' access to authentic and relevant science learning experiences.

The report includes examples of how this can be put into practice.

Conclusion

It is clear that science is important – for individuals, whānau, communities, and New Zealand. Every day, kaiako and teachers in early childhood services and schools across the country support learners' curiosity and engagement in science, but we have more work to do. New Zealand students are not yet achieving as well in science as we would hope, and their engagement and valuing of science is less than their international peers.

ERO hopes these reports give leaders, kaiako, and teachers guidance and inspiration to support them to focus on steps they can take to strengthen the science learning opportunities they provide.



We appreciate the work of all those who supported this evaluation, particularly the learners, leaders, and kaiako/teachers who shared with us about science teaching and learning in their service or school. Their experiences and insights are at the heart of what we have learnt. You can find the full reports on science in early childhood education services and schools on ERO's website. www.ero.govt.nz



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