



# What's the Future for Science in the New Zealand Curriculum?

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## Abstract

This commentary article considers the current contentious debates over the national school science curriculum in Aotearoa New Zealand. The co-authors of this commentary are members of a group of science teacher educators and science education researchers who met recently to discuss concerns over aspects of these debates in the context of a wider political contest over the control and direction of education policy.

**Keywords** Curriculum policy · Knowledge-rich curriculum · PISA · Science education · Scientific literacy

Science education is critical for producing future scientists and developing the scientific literacy of the general population. School science education has a history of being a site of struggle between those who want it to remain the same, and those who want to see changes, and the former group usually wins (Blades, 1997). By the final years of school, the number of students choosing to continue to study science is very small, and consists mainly of students from elite schools and communities. Some of those who go on to complete a Bachelor of Science become science teachers themselves, and the education pattern continues. As the adage goes, if we keep

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doing what we have always done, we will keep getting the same results. As a country, Aotearoa New Zealand is currently in the midst of another round of this debate, and this commentary discusses some of the issues and options for a way forward.

The future of Science in the New Zealand Curriculum was debated at two events held in Auckland in mid-2024. The first was a national Science Education Summit on 2 July 2024, titled “Science Education: Fit for Purpose” and attended by 80 science educators from across the country. The second was the 55th conference of the Australasian Science Education Research Association (ASERA), held at Massey University Albany on 3–5 July 2024, which was attended by 170 leading science education researchers from 15 countries.

In conjunction with these events, a group of 15 science educators from Aotearoa New Zealand, with a combined experience of 400 years in the field, met together to discuss the future of the national school science curriculum. From this discussion, as a smaller group we co-wrote a position paper which has been disseminated to government and teaching partners. This commentary is based on that paper and aims to make a constructive contribution to the current and ongoing curriculum debates and developments.

We advocate the following key messages in designing the new science curriculum:

1. Science education should be meaningful, engaging and accessible for all students, regardless of their family and cultural backgrounds.
2. Science education provides an important foundation for an innovative workforce which contributes to Aotearoa New Zealand’s economic opportunities and prosperity, and a sustainable future in the context of the Anthropocene and current polycrises (climate change, biodiversity loss, food security, pandemics, etc.)
3. Science education should develop conceptual knowledge, as well as transferable, interdisciplinary skills such as critical thinking, systems thinking and analysis.
4. Science education should reflect contemporary science practices and help students use science to make informed decisions in their daily lives.
5. A refreshed science curriculum should align with international benchmarks such as OECD’s PISA framework.

Our vision is for a science curriculum that is knowledge-rich and competency-based, and which can empower all young people in contributing to an innovative economy, a thriving society and a healthy environment. To enact this vision, we recommend a science curriculum which:

- develops scientific literacy for our workforce and all citizens;
- empowers the development of science competencies to address the challenges and opportunities of the future; and
- equips future decision-makers to think and act across science and other disciplines.

Being knowledge-rich is important for scientific literacy, and this includes understanding scientific ideas, science practices, and how science itself works. But it is also essential that students are able to use science knowledge in order to evaluate research, data and information in a variety of contexts, so they can make informed decisions and take suitable actions as necessary. In other words, a knowledge-rich curriculum is important, but insufficient to achieve the vision. The new science curriculum must prepare students to be competent to use science knowledge to enrich their lives, and make our economy, society and environment thrive in a sustainable way.

In 2025, the Programme for International Student Assessment (PISA) will assess the science competencies of 15-year-old students in more than 90 OECD countries, including Aotearoa New Zealand. These competencies have been drawn from international best practice research and focus on the following:

- Explain phenomena scientifically;
- Construct and evaluate designs for scientific enquiry and interpret scientific data and evidence critically;
- Research, evaluate and use scientific information for decision making and action (OECD, 2023).

These competencies move beyond traditional, content-driven curricular models that focus on learning of science concepts, to contextualise learning for its application in ways that prepare students for the future. Such a competency-based approach is designed to be engaging, relevant and active, and to allow a young person to develop a science identity with which they are equipped to engage competently, confidently and actively in the world.

The world our young people are growing up into is different from that which most of us have experienced. Decisions that they will have to make will require an understanding of science and how to use their agency to engage with socio-scientific issues, artificial intelligence and misinformation (Osborne et al., 2022) and ecological challenges such as climate change and biodiversity loss (White et al., 2023). These are complex challenges that require competencies drawn from science as well as other knowledge systems in order to contribute to potential solutions.

Research presented at the recent science education events in Auckland, and a vast array of other national and international studies, are pointing to a worrying decline in student engagement in science, and, as a consequence, in their science literacy. These studies clearly indicate that contextual, inquiry-based learning, guided by a competent science educator who can underpin learning sequences and schema with a strong conceptual basis, is highly successful in engaging students, enhancing their learning outcomes and developing their science identity. These approaches also make space for other culturally-relevant knowledge to be explored alongside science. Doing so is key to increasing participation of Māori and Pacific students in science at school, and in subsequent science-related career pathways.

We have been encouraged by the recent development of Te Mātaiaho (Te Kete Ipurangi, 2023). This framework represents an important step forward for contemporary Aotearoa New Zealand. The draft science curriculum released for consultation

in 2023 echoes this development and provides a strong foundation for the writing still to come. The Understand/Know/Do model can be both knowledge-rich and competency-based when enacted through contexts. The model also allows for clear progressions of knowledge and competencies to be fostered by teachers in their classrooms.

Science education today is a complex endeavour that requires us all to work together in evidence-informed ways for the benefit of our young people, their futures, and the future of our nation and our planet. The terms of reference for the MBIE Science System Advisory Group identify a challenge for science education: “Career pathways [in science] are uncertain, diversity is limited, Māori and Pacific Peoples are under-represented and under-served, and there are difficulties in attracting and retaining the best talent” (Ministry of Business Innovation and Employment, 2024).

A strong, future-focussed school science curriculum is a key aspect of addressing this challenge, and achieving the aspirations to strengthen our science, innovation and technology system. Working in partnership with science teachers is another. Teachers need more science-focussed time in their pre-service education and, when teaching, opportunities to engage in quality science professional learning facilitated by knowledgeable science educators. Schools need access to research findings such as those generated by the 2024 Curriculum Insights and Progress study exploring Year 3, 6 and 8 students’ understanding of the nature of science, science knowledge and capabilities (formerly the National Monitoring Study of Student Achievement). Outcomes from PISA 2025 should also inform curriculum development.

We have a once-in-a-generation opportunity to design a contemporary, world-leading science curriculum. We owe it to our young people to get it right!

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**Conflict of interest** No formal ethics approvals were required in producing this work, and no authors have financial interests in the publication of this work. Some authors are current or past members of national and international committees responsible for setting educational policies. Maurice Cheng is on the Extended Science Expert Group of PISA 2025 Science Framework. Chris Eames is on the Environmental Science Subject Expert Group for PISA 2025. Davina Hunt is a researcher in the 2024 Curriculum Insights and Progress Study for Science.

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