



SUMMARY **3**

SCHOOLS & THE SCIENCE COMMUNITY

KEY ELEMENTS FOR PARTNERSHIP

ABOUT THE RESEARCH

A research project for the Ministry of Education explored how connections between schools and the science community could support more future-oriented science learning for all New Zealand learners. The research comprised surveys of teachers and members of the science community; case studies; focus group interviews with scientists and science educators; and a synthesis of New Zealand and international literature. The project was carried out by the New Zealand Council for Educational Research (NZCER) in collaboration with Learning Media and the University of Waikato. The full report is available at www.nzcer.org.nz/research/publications/strengthening-engagements-between-schools-and-science-community

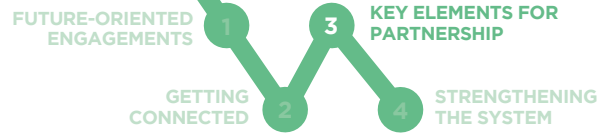
WHO IS PART OF THE “SCIENCE COMMUNITY”?

The “science community” broadly includes:

- working scientists and those who manage science organisations
- tertiary science educators and students
- science communicators
- professionals in science museums, science and technology centres, zoos, aquariums
- other people and groups that provide professional support for science or promote public science engagement.

The more inclusive term STEM (science, technology, engineering, and mathematics) is often used to represent the interconnected work of these different but overlapping communities.





SUMMARY 3: KEY ELEMENTS FOR PARTNERSHIP

What key ideas and practices enable partnerships between schools and the science community to support future-oriented science learning for students? What are the benefits for those involved, and how might these be scaled up for the benefit of all New Zealand learners? This summary describes two case studies from the research, and identifies some of the key elements for partnership that emerged across these and other science community engagement initiatives.

THE BENEFITS FOR LEARNERS

Partnerships between schools and the science community in a number of ways can provide many benefits for learners, including:

- helping learners see science in authentic contexts
- providing role models that inspire learners or help them to “see themselves” in science
- providing access to up-to-date science knowledge, expertise, resources or environments

To achieve these and other benefits, and to support *future-oriented* science learning, the nature of school-science community partnerships matters. For more about this, we recommend reading summary 1 in this series: *A rationale for future-oriented engagements*.

THE IMPORTANCE OF SHARED PURPOSES

In effective school-science community partnerships, all partners have a shared sense of purpose. To support *future-oriented learning*, these purposes often extend beyond meeting a short-term need (for example, to cover a topic in the curriculum or fulfil an assessment requirement). For example, case studies^[1] in our research included engagements that aimed to:

- give Years 7–8 students experiences to “awaken their inner investigator”
- support primary school learners to connect with science knowledge and expertise held within their own local community
- provide wrap-around support and pathways for secondary Māori and Pasifika students into health sciences, as part of a long-term strategy for addressing health service needs within their community
- support iwi-based and community-based goals to cultivate young people as science-literate decision-makers, empowering a community’s long-term engagement with science and scientists.

When partners within the school and the science community share a clear understanding of the deeper purposes of their connection, decisions about contexts and opportunities for learning can be made together. Initiatives can also grow, change, and evolve organically as partners see new opportunities arising from their collaborative relationship.

LENScience: Bringing schools and scientists together to promote scientific literacy

LENScience^[2] is based within the Liggins Institute at The University of Auckland. Its vision is “bringing schools and scientists together to promote scientific literacy”, and from the scientists’ perspective to enable communication and translation of science into community understanding. The LENSscience initiative provides an interesting model for thinking differently about the relationship between schools and their communities. The initiative suggests that scientists and specialist science educators need to work together with schools *and their communities*. This requires genuine partnerships across different areas of expertise across science and education. Just as it is unrealistic for school science teachers to keep up with advances in science, so is it unrealistic to expect scientists to have the pedagogical knowledge to work effectively with young people. At LENSscience, the science educator role is multifaceted and critical to the success of the initiative. The science educator not only works directly with students in the specialist classroom at the Liggins Institute, but also with teachers and students in schools and online. LENSscience educators also work in collaboration with scientists to create research stories that are both accessible to adolescent learners while also maintaining the authenticity of the research itself. LENSscience has a strong focus on working with Māori and Pasifika communities, as they are both underrepresented in the science sector and carry a disproportionate burden of disease and disease risk. The Māori and Pasifika initiative includes priority access to LENSscience face-to-face programmes for schools within the initiative, a student-scientist mentor programme for gifted and talented students, opportunities for students and scientists to co-host community events and a school-to-university transition programme.

www.lenscience.auckland.ac.nz/uoa



A Year 13 student from St Cuthbert’s College asks a question during a live interactive television programme within the Senior Biology Seminar Series, a blended e-learning programme run in partnership with schools. (LENSscience case study)

CONNECTORS AND CO-ORDINATORS

Our research highlighted an important niche in the science education ecosystem for community engagement “intermediaries”—people who can liaise between schools, science communities, tertiary institutions, and the wider community. People in these roles need a particular blend of knowledge, experience, and dispositions to be effective. These include:

- a sophisticated understanding of the nature of science
- credibility and connections with scientists
- recognising the need for science education to address a variety of needs and purposes
- ability to understand what is important to the school and the wider community
- familiarity with the operational characteristics of school science teaching and learning, including curriculum and assessment frameworks.

Their work often involves building and maintaining relationships, seeking and managing funding and resourcing, and identifying areas where research or evaluation is needed to enhance and refine programmes. The research showed that people in these positions are often employed on fixed-term contracts and need to periodically reapply for funding or seek new funding sources to ensure their work can be sustained over time. There also seem to be relatively few opportunities for people in these connector/intermediary roles to connect and network with each other at a regional and national level. These are challenges for building capacity across the sector.



A student from Te Wharekura o Arowhenua explodes a hydrogen balloon at Murihiku Marae. (Science Wānanga case study)

TIME AND RELATIONSHIPS

Time is an important factor in successful engagements between schools and the science community. *Immersive time* (for example, extended or multi-day programmes) gives learners opportunities to experience multiple interconnected parts of a science investigation process or context in depth. Repeated engagements over time enable learners to have multiple learning experiences with people from the science community over the course of a term, a school year, or over several years. Both forms of time are important for developing relationships. Many people in our case studies commented on learners developing positive, productive, warm, and rewarding relationships with both the science community partners and, in many cases, their teachers as well. Learning in environments outside the normal school or classroom context also helped to foster productive relationships as learners, teachers, and scientists began to relate to each other in new ways.

LONG-TERM BENEFITS FOR TEACHERS AND SCIENCE COMMUNITY PARTNERS

To have ongoing and long-term value, partnerships should be rewarding not just for the learners involved, but also for teachers and science community partners.

Benefits for teachers

Benefits noted by teachers in our research included:

- Teachers felt they now knew how to connect with people in the science community, and could more easily gain access to knowledge, expertise, and gear they needed to support their students' learning.
- Teachers' assumptions or expectations about what their learners were capable of had changed (for example, seeing what motivates students, seeing new capabilities or aspirations in students that they had not previously seen, etc.).
- Teachers felt the benefits gained from science community partnerships would translate into their future teaching practice, even with other learners.

Benefits for science community partners

Benefits noted by science community partners in our research included:

- finding it personally rewarding and motivating to help grow the next generation of people who will work in, with, and alongside the science community
- becoming better at communicating science, and developing their teaching abilities
- learning from the communities they work with, raising the possibility for cultivating long-term science research and development partnerships with those communities, for mutual benefit (see Science Wānanga case study on page 7).

Science community partners noted that working with schools was often seen as worthwhile but placed considerable demands on scientists' time. Our research identified both challenges and opportunities for sustaining these sorts of engagements over the long term (see Summary 4).

Science Wānanga: Integrating science and community interests

The University of Otago's Science Wānanga programme^[4] offers 2- or 3-day interactive science experiences for Māori secondary students, based on marae and in communities, and facilitated by tertiary students, scientists and the local community. Science Wānanga programmes locate science learning experiences within authentic contexts *selected by the community*. Science is presented alongside mātauranga Māori provided by kaumātua, which encourages students to understand connections and actions through science that are relevant to their lives.

We have all the resources of the university, [as well as] other institutions and networks at our disposal, so we are very flexible to make sure that we take what's relevant to the community [into science wānanga]. (Kaituitui wānanga/Wānanga co-ordinator)

Tolaga Bay Area School has been involved in Science Wānanga since 2007. The relationship with Otago University has supported the school and community leaders' confidence and capability to engage with many other science organisations.^[5] Relationships with the science community are thus embedded through the Tolaga Bay community, with the school firmly connected at the centre of these engagements.

The wānanga has really helped us to grow in our understanding of science and its place, not just in a science curriculum, but in a community and in an iwi. (Principal)

Senior students at Tolaga Bay Area School said that participation in wānanga provided a new and deep level of insight into the nature of science and its relationship to themselves, their culture, and their community. Students particularly commented on the two-way relationships with their science community partners.

All the people [from the science community] that come on the wānanga, not only do they give their knowledge freely, but they absorb the way that we think, they consider it ... (Student)

Students believed that Science Wānanga had provided them with a much more complex view of issues in their communities, and felt that they were carrying their new ways of thinking and seeing the world into all aspects of their lives, and could see how this connected with greater educational goals, even at the national level.

Science Wānanga and other things that open you up to different things, we're growing people who can express ideas and getting away from that thing that 'everything is black and white'. We're getting to a new age where people can question everything ... there's no end to the path. (Student)

<https://sciencewananga.otago.ac.nz/>

CONCLUSION

This summary has identified key elements for school-science community engagements that support positive outcomes not only for learners, but also for teachers, schools, communities and scientists. The final summary in this series considers what can be done at the system level to support a more co-ordinated future-oriented approach to science community engagement for all young New Zealanders.

Notes

- [1] See Bolstad & Bull et al. (2013). *Strengthening engagements between schools and the science community. Final report*. Wellington: Ministry of Education. www.nzcer.org.nz/research/publications/strengthening-engagements-between-schools-and-science-community
- [2] The Liggins Education Network for Science.
- [3] See Bay, J., Sloboda, D., Vickers, M., & Mora, H. (2012). Multi-dimensional connections: The Liggins Education Network for Science. In France & Compton (Eds.), *Bringing communities together: Connecting learners with scientists or technologists* (pp. 161–173). Rotterdam: Sense Publishers.
- [4] Science Wānanga is one of many outreach initiatives that align with the University of Otago's strategic imperative of "Strong external engagement". See summary 4.
- [5] As discussed in a recent article in the *NZ Education Gazette* ("Acknowledging history for future planning", 2012), some of these engagements were connected with Tolaga Bay community's involvement in hosting a major event associated with the 2012 Transit of Venus. <http://www.edgazette.govt.nz/Articles/Article.aspx?ArticleId=8634>



Dr Marc Schallenberg (University of Otago) shows Ngati Porou secondary school students how to take a mud core sample from the Uawa River. (Science Wānanga case study)



A Year 11 student from One Tree Hill College learns about transgenic technologies used to manufacture human insulin for diabetics through hands-on laboratory experiences. (LENScience case study—"Diabetes in My Community" programme)