



SUMMARY

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SCHOOLS & THE SCIENCE COMMUNITY

STRENGTHENING ENGAGEMENTS ACROSS THE SYSTEM

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.

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)

SUMMARY 4: STRENGTHENING ENGAGEMENTS ACROSS THE SYSTEM

What does research tell us about schools' engagements with the science community? How can we use this knowledge to support more effective future-oriented science learning for all young New Zealanders? This summary provides a basis for informed discussion about “next steps” to strengthen future-oriented science learning across the system. It should be read in conjunction with the other summaries in this series.

WHAT DO WE KNOW?

Our research suggests there is no shortage of programmes, initiatives, and opportunities for schools to connect with the science community. Even so, some schools are able to forge these connections more easily than others (see Summary 2). Many initiatives depend on key people and fixed-term support and resourcing, and there are too few opportunities for connection and co-ordination to join up *efforts across the system*. There is also a need for consensus about the purposes for connecting schools with science communities to ensure practices are evolving to meet current and future learning needs (see Summary 1). Our research suggests that many different stakeholders must work together to shape a science learning system that supports multiple types of engagements at various levels of schooling.^[1] These engagements will need to:

- meet the different needs of learners, teachers, schools, and communities
- address national needs for a science-engaged and knowledgeable population.



Students at Ngaio School learn with parents and scientists in the community. (The Clinic case study)

WHAT ENABLES THE SCIENCE COMMUNITY TO COLLABORATE WITH SCHOOLS?

Our research suggests the following factors are important (see also Summary 3):

- high-level commitments from the science community to support science learning and engagement for young New Zealanders, accompanied by resources and structures that enable these commitments to be realised in practical ways
- connectors and co-ordinators—people with knowledge, experience and dispositions that enable them to effectively liaise between the education and science communities
- a collaborative environment between organisations and institutions in the science community, so that partners can work together in service of the greater goals of supporting science engagement for all learners
- clear “lines of sight” to show how engagements with the education sector also contribute to the core business of the science community partners
- practical structures that recognise and support the return benefits of engaging with the education community for scientists and the science community
- deeply embedded relationships, including formal agreements, which can sustain connections and partnerships over the long term.

Science-community-education engagement as “core business”

The University of Otago case study^[2] illustrates the point that if community engagement is a key strategic imperative for an institution, outcomes with respect to the institution’s core activities need to be clear. For a university, those core activities are research and tertiary teaching. “Strong external engagement” is one of the university’s six strategic imperatives, and the university’s Division of Sciences has been leading the way in developing linkages and opportunities for schools. Work is currently being undertaken to show how the learning benefits of outreach engagements for tertiary students match the University’s desired graduate attributes.^[3] The Division of Sciences has also developed an Outreach Certificate that recognises and values the contributions that tertiary students make, as well as the contribution those engagements make to the students’ own learning. These and other developments to support science outreach are needed in order to grow and sustain an institution’s commitment to working with schools and communities over the long term. While universities are just one type of science organisation, the same goal of connecting science education outreach work with “core business” could apply to many other people and organisations in the science community.

SUSTAINABILITY, SCALABILITY AND LONG-TERM RELATIONSHIPS

Some engagement initiatives between schools and the science community are relatively small-scale, localised, and driven by a few committed individuals, while other initiatives are of a larger scale, involving multiple partners and activities. For example:

- LENSscience involves partnerships between the Liggins Institute, partner tertiary organisations, and teachers, with funding derived from public good research and teaching grants, government contracts, and philanthropic donations (see Summary 3).
- The Health Science Academies are supported by partnerships between organisations including the Tindall Foundation, CMDHB, the Pasifika Medical Association, several universities and schools (see Summary 2).
- The Science Wānanga initiative involves partnerships between the University of Otago and iwi groups, schools, and other members of the wider New Zealand science community (see summary 3).

These initiatives—and others like them—illustrate the importance of bedding in “deep” relationships and partnerships at the organisational or system level. These may be formalised, for example, through memoranda of understanding, or through committed working partnerships between organisations, or within and across different parts of a large organisation. These longer term organisational/system-level relationships and processes can enable the work of a science community engagement initiative to carry on and be insulated, to an extent, from the limitations of short-term contract funding, particularly if each of the partner organisations is able to find and access resourcing to contribute to the initiative’s needs.



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

HOW COULD THE CAPACITY OF SCHOOLS AND THE SCIENCE COMMUNITY TO WORK TOGETHER BE STRENGTHENED?

A number of key ingredients could support a whole-systems approach to future-oriented learning engagements between the science community, schools and the wider community. These include:

- strategic leadership to support knowledge development, sharing and co-ordination of school-science community engagement initiatives
- strengthening networks of “science connected” teachers and people in coordination roles across existing school-science community engagement initiatives
- ensuring equity of opportunity for all learners across all New Zealand schools
- identifying a number of key socio-scientific issues that have relevance to whole communities across New Zealand. With adequate secure funding, specialist science educators and scientists could work together to develop high quality resources that could be adapted to suit specific communities
- well-designed longitudinal research to evaluate the effectiveness of initiatives and seek opportunities for growth and synergies over time.



Students from James Cook High School carry out dissections at AUT as part of Counties Manukau DHB's “Health Could B4U” programme. (Health Science Academies case study)

OPPORTUNITIES FOR CROSS-SECTOR POLICY CO-ORDINATION

There are opportunities for cross-sector policy co-ordination across science and education. Both the Ministry of Education and the Ministry for Business, Innovation, and Employment already support a range of activities that bridge “the space between” science and technology communities and the schooling sector.^[4]

- Strategic policy development should seek to coordinate across areas of existing activity and policy which may have developed at different times, and with different drivers, but point in the same overall direction.
- There is an opportunity to re-evaluate the range and spread of activities that link the school sector with the science and technology sector and to develop a more coherent and co-ordinated high-level strategy. This could provide a frame for decisions about future activity, as well as provide a means for evaluating the impacts and contributions of each activity against a set of overall objectives.
- There are also opportunities to take a broad view of how talented young New Zealanders are supported and resourced to excel and have an impact on their communities and in international contexts in areas connected with science, particularly with respect to social, environmental and economic innovation.

CONCLUSION

The four research summaries in this series point to a range of opportunities for teachers, learners, and communities as well as the science community and policy-makers to work together to build more effective future-oriented science learning. The challenge is to realise these opportunities through co-ordinated and considered action.

Notes

[1] Stakeholders include educational and science policy-makers, science organisations, universities, science research and industry organisations and businesses, as well as schools and communities.

[2] 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

[3] See http://hedc.otago.ac.nz/tlp/graduate.do?cms=public_access.los.otago.ac.nz

[4] For example, the Ministry of Business, Innovation and Employment provides support for Royal Society programmes for teachers and talented students, the online science and biotechnology learning hubs and other initiatives to support New Zealanders' engagement with science and technology.