

Thirty years of science outreach at the University of Otago

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Abstract

Service to the community is one of the three major goals of New Zealand's universities, the others being advancement of knowledge through research and higher education through teaching. The University of Otago has been taking science to the community for over thirty years. Over that time, strong programmes of outreach to school students and the general public have developed. School programmes, such as Hands-on Science, Science Wānanga and the Advanced School Sciences Academy, present science in accessible and exciting ways and encourage careers in science. This paper outlines the history of science outreach at the University of Otago.

Keywords: New Zealand, history of science, University of Otago, outreach, public engagement, science communication, science education, science festival

Introduction

Since the establishment of universities, the tripartite mission of advancement of knowledge through *research*, higher education

through *teaching*, and *service* to those beyond the university, have been core goals. Over a decade ago, Bryne went so far as to predict 'engagement with others will not be an option for universities of tomorrow... it will be a defining characteristic' (Bryne 2000). The history of community engagement by the University of Otago began in the 1970s with community education through the Otago University Extension Office, including science extension activities run in schools and as on-campus holiday camps (Clarke 2014). Public engagement with science at the University of Otago began in earnest in the mid to late 1980s, with a flurry of activities, including a science quiz and a Maths competition, that continue to operate today (Zega 2012).

Hands-On Science

In 1989, Gerry Carrington (Physics Department), Warren Featherston (Zoology), Shirley Milward (Holiday Seminars for the Gifted and Talented), Mike Paulin (Zoology), and Kath Rice (Head of Science at Otago Girls High School) established a science camp for secondary students of exceptional ability (Otago Science Education Forum 1990). The group primarily

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Jean Fleming is a Professor Emerita in Science Communication, having retired after six years at the University of Otago's Centre for Science Communication. Jean is interested in effective communication of controversial scientific issues to a range of audiences, in the motivations of those who volunteer in environmental restoration projects, as well as new ways of engaging school students with science. She has a long-standing interest in outreach of science into the community and helped organise both Hands-on Science at Otago, for secondary school pupils, and the New Zealand International Science Festival in Dunedin for nearly 20 years.

Steve Broni has a BSc in Zoology (Marine Biology) from University of Glasgow and Masters in Marine Ornithology from University of Cape Town. He joined the Division of Sciences at the University of Otago in 2010 to establish the Otago University Advanced School Sciences Academy (OUASSA) Steve has a passion for science education and communication.



Sandra Copeland has worked as a secondary science teacher for many years. She has been associated with Hands-On Science (now Hands-On at Otago) since 2005, first as Camp Manager and later as Co-ordinator. Sandra has extensive experience of science education in New Zealand, and is still a teacher at heart.

Davina Hunt has a Masters in Teaching & Learning, postgraduate Diplomas in Wildlife Management and Education and a BSc(Zool.). She has been a teacher, researcher, policy advisor and facilitator of environmental education for sustainability for over 20 years in New Zealand. Davina joined the Division of Sciences in 2009 to expand the fledgling Science Wānanga programme, through partnerships with iwi and schools to enhance engagement of Māori students in science.



Rose Newburn is a freelance writer based in Dunedin. At the time of writing, she was Divisional Marketing and Communications co-ordinator for Sciences at Otago. Rose's first role at Otago was running Hands-On Science and this led to her involvement in and development of a number of interactive science programmes for the Division, working to make science learning accessible, equitable and above all engaging.

focussed on providing hands-on experiential learning to gifted and talented students. The first Hands-On Science Camp was held in January 1990, for a group of 139 students, 83 girls (60%) and 56 boys, from across New Zealand. Projects were offered in a range of Science and Health Science disciplines and the week-long programme included a wide range of social activities including a disco and a team sports challenge (Otago Science Education Forum 1990). Students stay in a university college hall and go off every morning to complete a range of research projects in around 20 science departments, including health sciences. In addition, a public lecture from an eminent scientist and a science quiz keep participants busy. The afternoons are spent in a variety of ‘science snacks’, allowing a glimpse of both public and academic science work. The programme culminates on the Friday morning with a public report-back session, where students in each project work together to present a 3-minute summary of their week of research.

In 2016, the new ‘Hands-On at Otago’ programme included Humanities and Business projects, with 355 participants. Many members of traditionally under-represented ethnic groups attended the 2016 Hands-On at Otago, with 22% Māori, 10% Pasifika, and 13% self-identified Asian attendees. Informal exit polls suggested the week developed confidence to enrol in tertiary study (Sandra Copeland & Rose Newburn, pers. comm. 2014; Zega 2012), but in addition, the experience may promote understanding of the research process (Hodder 2010).

International Science Festival

A biennial International Science Festival (NZISF) was initiated in Dunedin in 1997, by Dunedin’s Deputy Mayor, Dame Elizabeth Hanan (Barnett 2010). The NZISF is a not-for-profit organisation that aims to promote and celebrate science, technology and the natural environment to a general audience, and show that science is exciting, fun, and accessible (Green 2014). The festival is well supported by the Dunedin City Council, the University of Otago and a number of commercial sponsors. The first NZISF brought in over NZ\$4 million to the city and by

2000 the event injected more than NZ\$5 million into the local economy (NZPA 2000).

Ticket sales and online polling suggested that over 16,600 people attended the 170 events in the 2016 festival, an increase of 8% from 2014. Over 95% of attendees surveyed experienced increased knowledge and interest in science and were likely to recommend the festival to others. In 2016, for the first time, there was a 100% positive response rate to the question ‘Did you find the events interesting?’ (Green 2016).

Academic and general staff at the University of Otago participate in a two-day Science Expo (Figure 1), held on campus, involving more than 30 displays, presentations, exhibits and workshops for all ages and appetites (Green 2014). The Science Expo attracts 2,500 to 3,500 people each festival, allowing direct interaction between scientists and members of the public (Strategy First 2010). The Expo also provides staff and students with an opportunity to practice effective communication of their science to the public.

Science Wānanga

In 2007, a conversation between Rose Newburn, Dr Stephen Scott and Dr Paratene Ngata (a leader in Māori health from Ngāti Porou), demonstrated the iwi’s strategic imperative to increase the number of rangatahi (young Māori) achieving in science and health sciences. This led to the development of a two-day marae-based camp, sharing knowledge between Māori and non-Māori scientists and providing field and lab-based science activities to young Māori from local schools. Within four years these Science Wānanga had expanded to annual three-day, two-night experiences for seven iwi. As the programme developed, iwi and schools chose science topics of local relevance, some of which also provide a platform for on-going research for university scientists, informed by local community knowledge. This gave rise to Mātauranga Māori (traditional knowledge) being valued by scientists and science being valued by Māori communities and provided excellent learning opportunities for the attending students and their teachers (Davis 2014).



Figure 1. Professor Mark Stringer (Department of Anatomy) describes the muscles of the human body, painted on a live model, for the University of Otago Expo at the 2012 New Zealand International Science Festival.

Photograph J.S. Fleming

There have been 31 Wānanga delivered by the University of Otago and iwi partners since 2008. The programme has been cited by UNESCO (Mulà & Tilbury 2011) and the New Zealand Council for Educational Research (Bolstad et al. 2013) as an excellent example of successful community engagement. Science Wānanga are a tangible expression of the University's partnerships with iwi.

The Otago University Advanced School Sciences Academy (OUASSA)

The OUASSA programme, jointly funded by the New Zealand Ministry of Education and the University of Otago, was developed in 2011, to target potentially high-achieving science students in lower-decile, small, and rural/provincial New Zealand schools (Zega 2012). Registration and travel costs are fully funded for the OUASSA. It brings 50–60 potentially high-achieving students to Dunedin and introduces them to cutting-edge research, through practical projects held over two 5-day residential science camps. There is also a strong focus on communicating science: students present 10 min science shows at the Otago Museum at the end of the second camp. Two Professional Development Workshops for teachers are also run each year and on-line support is provided throughout the year to both student and teachers through a 'Virtual Academy'. OUASSA has had a significant positive impact on the tertiary trajectories of attendees (OUASSA Review Panel 2016).

Departmental outreach at the University of Otago

Outreach activities can be found in departments from all Divisions at Otago, including Law and Commerce (scienceoutreach.otago.ac.nz). Two examples stand out in the Division of Sciences. Since the mid-1990s, the Department of Marine Science has developed a broad range of educational programmes at the NZ Marine Studies Centre, for school groups of all ages, gifted and talented students and public demonstrations, as well as a nation-wide citizen science initiative called Marine Metre Squared (Zega 2012). The Department of Chemistry invests in outreach to intermediate pupils, using staff specifically hired for this work (Warren 2011). Chemistry has a long tradition of chemistry 'magic' shows and plays (Peake 2011). Senior Teaching Fellow Dave McMorrnan also runs a weekly programme on Otago Access Radio called Science Notes, where postgraduates talk about their research and play their favourite music.

Recognition for community engagement at the University of Otago

Recognition for community service has been built into the promotion process for academic staff for decades. Community engagement or outreach activity is now seen as a valid form of community service for career development purposes. The University's Strategic Direction to 2020 encourages strong external engagement of staff and support for under-represented groups in university study (Hogg 2014).

Recognition for outreach activities by non-academic or 'general' staff has been slower to arrive. Many non-academic staff are involved in community engagement, either as practitioners or as administrative support. The University's Personal Development Review process for general staff includes the competencies *Service to Customers* and *Initiative and Innovation*. General

staff are now able to use these to receive recognition of their outreach activities (University of Otago 2014).

The opportunities for students to engage with communities may depend on their particular discipline. In some courses formalised engagement activities may be compulsory, and/or credit bearing, or there may be paid positions that make use of the students' area of expertise. Some activities are developed by staff and extended to students, such as the Chemistry Outreach programme; and some are student-led, such as the Orokonui Ecosanctuary initiatives led by Zoology PhD Bastian Egeter (ODT Magazine 2015).

The Science Outreach Certificate

Outreach activity by students gained recognition in 2013, with the establishment of the University of Otago Outreach Certificate (Dick 2013). Students register to complete a portfolio of community engagement of 40–60 hours of outreach activity. Students report improved communication skills, ability to work in teams, as well as better personal organisation, project planning and confidence (Hesson *et al.* 2014; Brown *et al.* 2016). Administration of the Certificate is through the Division of Sciences at Otago, but outreach hours may be completed in any of Sciences, Health Sciences, Humanities and Commerce. Since its establishment, over 70 students have signed up for the Certificate, over a wide range of disciplines (Dick 2013). The Outreach Certificate may therefore become a formal way of assessing students' abilities to engage with the public.

The future

With the development in 2013 of the National Strategic Plan for Science in Society, 'A Nation of Curious Minds - He Whenua Hiriri I Te Mahara', by the New Zealand Ministry of Business, Innovation and Employment, the scene changed for outreach activities throughout New Zealand. Now, public engagement with science was recognised and funded.

The University of Otago has responded by expanding outreach, including 'Lab in a Box' (Gibb 2015) and Hands-on Otago. The Otago Museum now houses the NZISF offices and the Perpetual Guardian Planetarium, providing more opportunities for outreach by Otago students. Outreach activities are thriving, recognised and rewarded at the University of Otago.

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