Life on the ocean wave

Gifted students in the South Island have the chance to attend a university-based withdrawal programme at the New Zealand Marine Studies Centre. Steve Cutler, the centre's Educator, explains the thinking behind the programme.

Introduction

The New Zealand Marine Studies Centre (NZMSC) is a unique educational facility located on the shores of Otago Harbour, just 30 minutes from the centre of Dunedin. The centre is part of the University of Otago and operates in association with the adjacent research facility, the Portobello Marine Laboratory.

The facilities of the NZMSC include lecture rooms, a teaching laboratory with running seawater and associated microscopes and scientific equipment, and an aquarium. Combined with the facilities of the Portobello laboratory, the Research Vessel *Polaris II*, and the immediate marine environment, it creates a unique centre for student learning. In addition, the NZMSC has access to extensive human resources through the scientists, graduate students and technical staff of the Department of Marine Science.

The NZMSC has a long history in delivering learning experiences that cater for mainstream curriculum and assessment needs of primary and secondary schools through LEOTC (Learning Experiences Outside The Classroom) contracts with the Ministry of Education. The Portobello programme caters for schools in the southern half of the South Island, while our outreach programme in Nelson caters for schools in the Tasman, Nelson and Marlborough regions. Students from early primary to senior secondary level have the opportunity to learn about a range of marine topics and issues through 'hands-on' experiences with live organisms in natural habitats. They find out what marine scientist do, design and carry out their own investigations, and make their own observations. Our programme currently includes three-day blocks for senior students.

It is this experience with delivering education that provides the foundation of our Talent Development Initiatives (TDI) programmes for gifted learners.

Designing programmes for gifted learners

The guiding principles for the design of our gifted programmes are focused on the particular needs of the learners. The separate class/all day/residential model has a number of advantages – particularly for those who are gifted and have learning difficulties. The advantages include:

- The elimination of disjunction and lack of continuity in pursuing a particular area of Interest or enquiry
- Being better suited to students' emotional needs (self-knowledge, self-esteem, motivation)
- Better accessibility to expertise in the particular themes and enquiries pursued
- The opportunity for small numbers from small schools to meet and work with like-minded learners

This last point was emphasised in the 2001 working party report to the then NZ Minister of

Education, Trevor Mallard – 'Core principles for gifted education in New Zealand' – which said: 'It is very important that opportunities are provided for gifted and talented children to spend significant time with others of like ability and interest.'

Identification

We communicate and coordinate with schools to identify suitable students using a range of identification tools. There are only two or three students accepted from each school for each programme, so students mix with like-minded peers from a diverse range of backgrounds and experience.

We ask for a minimum of three different means of identification to be used in selecting potential participants. These may include:

- teacher observation and nomination
- rating scales
- standardised testing
- portfolios, performances and auditions
- parent, caregiver and extended family nomination
- peer nomination
- self nomination
- profiles

We also make it clear to teachers and schools that participants don't need to be gifted in science. We have had very gifted musicians, writers, and individuals with a range of talents who contribute and gain a considerable amount from working on these programmes.

What's special about marine science?

There are a number of clear reasons why our gifted learners need to have an in-depth experience and understanding of the marine world.

1. Identity: New Zealanders are nowhere far from the sea. We are an island nation with a rich maritime history. Both indigenous peoples and more recent settlers have personal oral and written histories that include ocean voyages, fishing and seashore recreation.
2. Geography: New Zealand is a small island nation in the South Pacific. Our maritime climate is influenced by both subtropical currents and sub-Antarctic water masses. We are in the centre of a world of water!

3. Ecology: We share this space with ten per cent of the world's marine bio-diversity and participate as part of the complex biological and geophysical systems that ensure our survival.
4. Economy: New Zealand's exclusive economic zone is the four largest in the world. Fishing, aquaculture, eco-tourism and the social capital of recreation are all based on sound marine science linked to careful management.
5. The science: marine science is multi-disciplinary, multi-dimensional and full of huge diversity and continual new discovery.
6. The family: no matter how complex the science, everyone can communicate and share aspects of their studies with a wide range of people because we all have some personal link and understanding of the sea.

Meeting the needs of gifted students

There are three multi-day programmes. There is a programme specifically for students from rural isolated schools (nine days). Additionally, there are programme for students from local Dunedin city schools (eight days) and for nine small primary schools around the Otago Harbour (five days).

The programmes operate under broad open themes that are used to link ideas, connect to broad interdisciplinary concepts and sometimes act as analogies for meta-cognitive thinking. For example, the theme used for year 10 programmes (age 14 years) is 'Making sense of the marine world aids survival and enriches lives.' This is used to begin generic experiences in the laboratory where participants use their own senses and then instruments to establish a common foundation to a marine understanding. It also links to team laboratory challenges, looking at the senses and responses of a range of live marine creatures in relation to survival in the marine world. The sensory lab, involving salinity, temperature, light, dissolved oxygen, size and weight, is a key component of this first part of the programme.

Small research teams are put together using detailed information from teachers and the students' applications. We aim to have a balance of roles in the teams and also to balance the strengths and weaknesses of participants. These teams are put with a young postgraduate research student as a mentor. They are given a specific research project area to develop questions, hypotheses and methods before carrying out practical hands-on research into specific real world topics using university facilities and equipment.

Keynote talks and presentations on aspects of science, science philosophy, teams, meta-cognition and thinking, data analysis and modelling, analogy, conceptual development and applications, communication and presentation are used to stimulate and challenge students into looking and thinking in depth about their learning and problem solving.

Every day – and the end of each block of two or three day – the teams reflect, review and prepare presentations to communicate their work. These presentations introduce the process of peer review and critique as an essential part of science and learning in general. Communication challenges are scaffolded throughout the programme, including a press release, a Power Point with the team giving an oral presentation, a mini scientific poster (which can go up on our web site), and a 'novel' presentation. The idea of this last challenge is to get the students to think creatively about ways to get across their ideas and project-process, as well as results, to different audiences. Some of the ways they have come up with include a puppet show, TV interviews, a soap opera, a mini drama, songs, and clay model figurines acting out. There is also an opportunity for the use of analogies and lots of humour!

The programmes have major residential components where students stay overnight together (on a nearby island where there is simple lodging). They have different residential teams who share the cooking and cleaning, as well as getting involved in challenges.
These are facilitated by a staff member experienced in managing school camps, but teachers and parents from participating schools are also encouraged to help out.

Getting the right staff

When advertising for staff, we specifically target young post-grad students to be trained as mentors as the programme participants tell us that:
a. They find it easier to relate to them.

b. The post-grads' stories about following different pathways into science are more relevant to them.
c. The mentors have the requisite knowledge and expertise to help guide a project but they are still learning and can share in the journey being undertaken by the participants.

Conclusion

Over the past three years our TDI programmes have gained an increasing reputation for delivering authentic, real-world learning experiences that are enriching and enhancing for gifted students. Teachers tell us that observing and sharing the experience is both fascinating and exciting professional development for them; parents are enthused by their sons and daughters returning home fired up about their experiences, their research and the friends they are making; schools not in our original pool are requesting an opportunity to take part; and teachers are keen to book in whole GATE classes to experience some reduced and affordable forms of the programmes.

Participating schools now proudly list the programme as an important part of their gifted education strategies in newsletters and parent information brochures. At present the centre is working in conjunction with Dr Tracy Riley of Massey University to survey all students, teachers and parents who have been involved in the programme over the past three years. We intend to keep track of our 'graduate' participants and look forward to learning about their successes.

More information can be found at: www.marine.ac.nz