

## Responding to Teacher Needs: 'Fossils', a Hands-on Education in New Zealand

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The Science Centre, Manawatu Museum and Art Gallery combines visual and hands-on experiences of science and technology, heritage and art under one roof. A staff of 38 mount about 40 exhibitions a year, including touring shows and those that use our own collections and built exhibits. The organisation serves a city of approximately 75,000, but many visitors come from much further afield.

Nearly 20,000 school (mostly primary age) and adult students a year take part in education programmes. The Ministry of Education provides a grant to support such learning experiences outside the classroom. Close links with local educational institutions (Massey University and UCOL, a technical college), the Royal Society of New Zealand and numerous Crown Research Institutes provide access to wide ranging expertise. The same organisations support adult education through lecture series, field trips and so on.

The majority of education programmes are run by one of our staff; a self-lead option is available for visiting teachers, but is rarely taken up. There are probably several reasons for this. Teachers may bring their class to study a topic they are not familiar with themselves. Museum staff already familiar with an exhibition or programme can greatly enhance student learning. Teachers say they take away new teaching ideas after watching museum educators in action. They also enjoy watching their students learning in a different setting. Sometimes students who struggle in a classroom setting excel in a hands-on science exhibition.

While exhibition-based education programmes are popular, so too are permanent programmes that make use of particular resources that are not readily available in most schools. These include a Starlab planetarium, a purpose built water science area, and museum and art collections. Museum educators develop new programmes in response to teachers direct requests and perceived needs. The 'Fossils' programme described below is one such new programme.

## The 'Fossils' programme

Through informal discussions with teachers, and as a result of a study carried out by Brian Lewthwaite of the Massey University College of Education, it became clear that many primary school teachers felt that they lacked the skills and/or resources to adequately cover several aspects of the "Making Sense of Planet Earth and Beyond" strand of the National Science curriculum. As a result of this, an education programme called "Fossils" was devised, in consultation with two geology teachers at Massey University (Ciel Wallace and Julie Palmer). The programme was an immediate success, and continues to be popular.



School children examine a fossil at close range.

The two-hour programme starts with an investigation into what a fossil is, viewing and handling examples from NZ and the rest of the world.

Students then use a specially made piece of equipment, based around a car jack, to turn loose sediments and shells into a plug of fossil-bearing rock under high pressure. This is a very clear and memorable way of experiencing one method of fossil formation.

Students then work in pairs to excavate replica fossils out of sand trays. They go through the whole process of digging: cleaning, drawing, identifying and interpreting. After identification, fossils are placed in the correct positions in a stratigraphic column, after which the

real detective work begins. Using the fossils and their own knowledge of organisms in present environments, augmented by information from the educator, students put together a picture of what NZ used to be like at different periods in the past. An actual picture is constructed in a free standing window frame, encouraging the concept of fossils providing a window on the past. At this point, NZ is placed in the broader context of plate tectonics and global change.

Having practised on replica fossils in a hypothetical rock section, it is time for the real thing. Each student excavates a piece of fossil-rich, million-year-old, mudstone from a local coastal site. Previous activities kept the students focused, but from now on total absorption sets in. A single delicately-spined gastropod may take half an hour to extract, other shells and fragments are quicker. The

magnifiers and microscope are in constant use, the conversation is totally focused, and every new find sends students scurrying for clues to identification. Students rapidly take on board the new vocabulary of the palaeontologist.

This excavation can easily take an hour, and the session is rounded off by interpreting the finds; what was our site like a million years ago? The programme was actually developed to be about rocks as well as fossils, but students become so absorbed in the fossils, that rocks are only dealt with after specific urging from the teacher. This rarely happens, as teachers become as lost in the adventure of 'real' palaeontology as their students.

### **What is the attraction of this programme to teachers?**

The following observations are based on questionnaires filled out by teachers at the end of each programme. The most obvious reasons are that it fits the science curriculum, and is hands-on, using resources not often available in schools. The programme is good too because it not only tackles some specifics of earth science, it also encourages basic science skills and attitudes. Social skills and critical thinking are integral parts of the programme. Students are the most obvious beneficiaries of such a programme, but museum educators are also mindful of the needs of teachers. Placing their students in the hands of an expert and enthusiastic educator enables teachers to spend time with individuals, or to expand their own knowledge. If teachers pick up enough ideas, resources and confidence in the topic while they are with their students, they may well decide to have a go back at school in future. We provide loan kits in many subjects as extra resources. We also provide workshops to further equip teachers so that they can run similar programmes themselves. While this may not be good for our visitor numbers, it is surely healthy for education in schools.

The 'Fossils' programme looks set to be a permanent feature of our education menu. Continuing to assess and respond to teacher and student needs will help us to maintain our standing within the education community. One of this institution's strengths is its ability to provide educational opportunities across a wide range of curriculum areas, social studies and art as well as science and technology. Obviously we cannot provide everything that teachers request, but contacts throughout tertiary teaching organisations, research institutes and community groups enable us to be 'knowledge brokers' in our region.

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