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Neil Cherry, scientist, teacher, politician, peace worker

Part 4

Teaching and the development of successful teaching methods

Dorothy - 23/05/03

Teaching at Rangi Ruru
Neil taught physics at Rangi Ruru Girls' School to supplement his income while studying for his PhD. At this time he developed a strong interest in the welfare and education of women and girls. He wanted to dispel the widely held view that girls can't do science. He learnt by experience that while boys liked equations and formulae girls learn better through pictures and stories, the method used at the Rudolph Steiner School. He used this method to teach physics - concepts leading to pictures, from which come graphs, equations and understanding. Learning in this style led to big increases in the enrolments in the physics classes.

Lecturing at University of Canterbury
While working on his PhD in addition to teaching at Rangi Ruru Neil did some lecturing on Geophysics to first year physics students at UC. This was in the third term, the lectures were late in the afternoon on Thursdays and Fridays, and there were six hundred students divided into three groups. The stage in the year, the timing of the lectures and the size of the classes would be viewed by most lecturers as not conducive to exciting teaching methods. Neil's instructions from the course supervisor were, "Prepare, present, and get out." Basing his teaching on his Rangi Ruru experience Neil would not accept such instructions. He would do better!

"I got some lovely pictures of an aurora, and said to the class, 'Hi, we're going to look at some natural phenomena. I'll show you some pictures and see if we can work out what they are.' I deliberately showed pictures that at first would make it difficult to identify the aurora. Then someone said, 'Is that an aurora?' That led to a discussion with the class who responded well. I basically told stories about how the aurora occurred, defining the layers of oxygen and nitrogen. 'If you get an idea of the earth's magnetic field going round when it comes down to the Poles here is the aurora. So our theory is that it's the electrons coming out of the solar wind, zapping backwards and forwards, and when it comes down to the low part of the atmosphere near the Pole if it hits a molecule it excites it and then when it calms down it lets off a photon of light - and that's the aurora. If there's a solar storm it squeezes the magnetic field down and pushes the aurora north from the band outside the Antarctic up towards Campbell Island.

"I described an experiment conducted in the International Geophysical Year 1958-9. Two aircraft flew at the ends of magnetic fields towards the aurora in both hemispheres with time lapse movies. When they showed them side by side they were a mirror image of the aurora. If there is a flash in one there's a flash in the other. It was agreed that it is the magnetic field coming down.

"I told the story of how we learned what the aurora was, how we learned about the different colours, and then went on to other phenomena like continental drift, the earth's magnetic field reversal, the earth's internal core, flowing different ways and making connections such as the Pacific Plate and the Australasian Plate, whose connection has produced New Zealand, with our high mountain ranges. I was trying to give them pictures which led to the understanding which led to the graphs which led to the frequencies which led to the colours. It was my Rangi Ruru approach."

Involvement at the Rudolph Steiner School
By this time the girls were attending the Rudolph Steiner School and in keeping with their usual pattern of involvement Gae and Neil worked hard for the school, and were very interested in the teaching methods.

Lecturing at Lincoln University
Neil has used the same teaching method for his classes in meteorology and environmental science at Lincoln.

"I want them to see pictures, so when I teach the health effects of the environment I say 'How does the body work and how does this thing come in and change it?' I want them to see a picture of a cell, of a brain, of a body. I like to follow the process so that they see how the thunderstorm in one area produces a signal which has certain results. I believe it's classical science.

"I was absolutely amazed to find that the work of the guy they call the Father of Modern Medicine, Hippocrates, in Greece more than two thousand years ago, was about bringing science into medicine. The biggest scientific area he was looking at was weather, and how the humidity, or the northern cold winds, or the southern warm humidity winds were affecting people's health. So when people asked me to research the impact of the nor'westers or the long cloudy periods of winter I went back to Hippocrates. He was called a doctor, because he was talking about people's health. The impact of weather on people's health has been my fascination."

With Neil as her supervisor Carolyn Doughty in her Masters thesis did research on the relationship between weather and the incidence of depression, suicide and road accidents.

Neil was teaching about the impact of weather to Park Rangers working in the mountains with the general public and school groups, so he did research on how it was possible to reduce the risk of hypothermia.

"When the weather is not normal don't act normally". People with hypothermia have their brains going to sleep so their friends have to notice that and deal with it before their brain goes to sleep. Another philosophy is to recognize the physiological syndrome called "Press Onitness". Amateur outdoor guys often try to Press On rather than turning back when the weather isn't normal.

Neil as lecturer in a wide range of courses
Neil's main purpose in teaching at Lincoln was to establish meteorology and agricultural meteorology as subjects to be included in six different degrees, including agriculture, horticulture, landscape architecture, recreation and tourism, commerce, and natural resources engineering.

The first course, Introduction to Natural Science, was taught to a wide range of first year students and the teaching of the course was divided between Neil and staff in the Soils Department, with Neil teaching a third of the course.

Neil gave an introduction to the philosophy of science showing how it was possible to recognise patterns, the misuse of science, understanding the importance of weather and climate, the geological

history of the world and the history of the development of the atmosphere.

Using his method of making the class see pictures and discover patterns as he taught he led the class through step by step development - the role of early thunderstorms, and the formation of the ionosphere converting water H2O, and carbon dioxide CO2 to plants with oxygen O2 in the atmosphere. All developed under water since they needed an area protected from ultra violet (UV) coming from the sun because there was no ozone layer at that stage. As oxygen in the atmosphere built up some the O2 got broken up into two O's which could attach themselves to O2 and form O3 - named ozone.

A major role of the atmosphere was to filter out the ionising radiation from the sun by ionising the high atmosphere and forming the ionosphere. That took out the ionising alpha and beta particles and the X-rays and the gamma-rays, but did not filter out much of the UV which kept coming to the surface of the earth. This is why plants could not develop on land until the ozone layer was formed through photosynthesis of plants and other biological organisms in the water.

The more the ozone developed the less UV the earth was exposed to, and the plants moved higher up in the water and eventually the ozone was sufficient to take out almost all of the UV and plants could grow on the land.

Twelve scientific principles
Two lectures in the course were allocated to the topic of twelve scientific principles, put together to explain the pattern of development in the natural world. They were designed to illustrate that the role of science is primarily to understand the natural world and make sense of it through patterns.

To increase students' awareness Neil would ask them questions such as:

"About four million years ago what did the weather sound like?
What were the clouds?
What was the natural environment back then after the volcanoes had emitted water, carbon dioxide, and hydrogen sulphide?"

Next question - "How did the first drop form?"
There were dust and particles in the atmosphere, and then in a fairly high layer it was colder than 100 degrees Celsius. Here two water molecules were introduced to each other by a particle and started to form the first drop. This was the first day liquid water existed in the world. That was the start of the first cloud, but it took several hundred thousand years for the earth to cool enough for clouds to form that were big enough to start the rain. The world was hot and humid.

Next question - what were the first clouds and how did it sound?
Neil recalls how the faces of the two hundred odd students would start to light up as they suddenly saw that next came the thunderstorms (Cumulonimbus) which came in the hot humid atmosphere with the temperature on the ground over 100 degrees. The earth's surface had begun at 7,000 degrees and was cooling down but still over 100 degrees. This was a very noisy environment with the sound of booming thunder and the sky lit by lightning.

Next question - "What was the sound when the first rain drop hit the ground?"
The ground was still quite hot but less than 100 degrees. As you observe during summer showers, the biggest drops get down first. Dropping onto ground that was a little cooler than 100 degrees Celsius, what was the sound? Pause, then all across the room, "pssss".

Next question - "At this time were there any lakes, oceans or rivers?"
A very quick answer came - NO - this was the first liquid water drop to get down to the ground.

Courses in Meteorology
Thirty to forty students enrolled for the second year course in meteorology, and twelve to fifteen for the third year course in

meteorology where three or four papers were offered. These could be credited to a variety of degrees. Masters papers were also offered, followed by a PhD course. Stuart Larsen and Vere Smythe were two of several graduate students under Neil's supervision who completed a PhD.

Environmental Physics

In 1974 Neil taught the first year course in environmental physics which was taken by students in their first professional year at Canterbury integrating physics and biology. He continued teaching this course for twenty years. When he took his sabbatical in 1996 Stuart Larsen took over teaching it.

Dr Neil Cherry (right) and Dr Vere Smythe at graduation

All the first professional year for Natural Resources Engineers was at the University of Canterbury, but part of the Second Professional course and all of the Third Professional course were taught at Lincoln. Neil's teaching schedule involved a lot of travelling as well as many hours of teaching.

Sadly the course Introduction to Natural Science has been cut and no meteorology courses are taught at Lincoln now.

A very heavy teaching load

In addition to the courses described above Neil taught five or six courses a year, including teaching Instrumentation, developing specialist courses for the Park Rangers as part of the Recreation degree, and developing the Energy Policy course for the course in Natural Resources Management. This amounted to about twice the normal teaching load.

It was only much later, after twenty years teaching the heavy load, that five years ago, on returning from his sabbatical, Neil gave up teaching the courses which were offered for several degrees and taught only for the Natural Resources Engineering degree.

Public lectures and interviews

At this stage Neil was being asked to give talks to many groups such as tramping clubs, Probus, business groups, Rotary Clubs, PTAs, school clubs, church groups, the Hospital Tramping Society, and political groups associated with both the Labour and the National Parties. They wanted him to speak on peace, the environment, weather or the impact of electromagnetic radiation. They amounted to several hundreds and he accepted all the invitations because much of his research was in response to public interest. At the same time he was involved in hundreds of interviews with the media.

At one stage he was asked at Lincoln what he was doing with his time, so he kept a log for six years about his talks and media interviews and the Extension Committee said that he as an individual was doing more than 30% of Lincoln University's extension work. At the same time he was doing over 1.8 of a full time teaching load in order to build numbers and qualify for an extra staff member, but what happened was that they employed other engineers but not another meteorologist because "Neil was coping".

Reduction in time at Lincoln

After election to the Regional Council in 1992, Neil had to ask for a change to a 70% position at Lincoln. Instead of being given 70% of his existing load, he asked them to define a full time load and give him 70% of that. It took two years for Lincoln to define a full time position and only then was he able to do 70% of the work for 70% of

the salary. Later he changed to do 50% for 50% of the salary - which involved his doing about a quarter of what his "full time" position had demanded. When he reduced his commitment to 50% another lecturer had to be employed full time to take up the balance of the work.

For more information about Neil Cherry's scientific research go to his website www.neilcherry.com