ATTACK!
THROUGH THE HOLISTIC CURRICULUM
NETWORKONNET for an holistic curriculum and a responsive education system
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Welcome to **ATTACK!** a two-page occasional publication. Most of **ATTACK!** will be concerned with the holistic curriculum which, if acted on, is a fundamental way to undermine the present undemocratic education system. Don't be discouraged if opportunities to teach holistically are limited, do your best, be a guardian, and act as a witness to this culturally significant and inspiring way of teaching and learning. **ATTACK!** is a partner to https://networkonnet.wordpress.com

Attack! 54 Science perspective Part 2

Tony Fisher was a primary teacher for thirteen years, a science adviser in Wellington for seventeen and, in 1994, a field officer for NZEI. He was national president of the advisers in the early 1990s. The article was originally written for Network Developmental Magazine*. It is a most useful introduction to a curriculum area that perplexes many teachers. There is evident in the writing something of the more relaxed tones of yesteryear.*

Science education in practice:

1. What is the difference between a project and an investigation?

A project is a display of work based on others' ideas, a regurgitative process bearing little evidence of a learner giving proof of their own ideas being tested.

An investigation is a learner pursuing an idea, observing and testing that idea, reaching conclusions that can be reasonably validated by the evidence of their investigations, and the methodology being such that others can replicate it and come up with the same or similar results.

Scientists also make use of the work of others, their skills, experience, and knowledge as part of their investigations. They also research their field of investigation to see what others have found previously.

In primary schools, educators should encourage learners to get help from others, parents, other learners, adults, scientists. The learner's task is to show **proof of investigation** which indicates what the learner has got from the investigation. It is at this stage that one can find out if they are the learner's own ideas being recorded, or if they are the ideas of others.

On the one hand, if the ideas and conclusions reached are those of the learner then you are looking at an investigation. If they are the ideas of others, then we are most probably looking at a project. In my view a project is more properly a language or study skills exercise.

'Science involves people investigating the living, physical, material, and technological components of their environment and making sense of them in logical and creative ways.'

2. An investigating process

I have found this simple process a successful method in class, school, and science fair settings. It quickly identifies for the educator whether an investigation can take place and once completed, whether the views of the learner can be identified. As a chief judge in science fairs, I have found it very easy to see if the hypothesis (question) has been answered and the limits of the investigation identified. It is simple to see if the conclusions reached have been validated by the testing.

The four step investigation process:

1. **My question**: The investigator records what he or she discovers in response to that question.

2. **What I know now**: The investigator records all he or she knows about the question. If the person already knows the answer, then there is no point in investigating it further. The educator can also at this stage make a judgement as to whether it is possible for the learner to investigate it in the time available. Many topics like volcanoes and dinosaurs lend themselves to study-skills rather than investigation processes.

3. **What I did**: This is the vital stage. What differentiates science from propaganda? It is a step-by-step record of what actually happened; it is often in diary, note-taking form. It records how the children went about observing, testing, and trying out their question. It is vital to record the failures as well as the successes. Others can read what went on and may suggest ways to revisit the investigation by another route. More importantly, it may help show others not to go along that path. Investigators also need to include references about their sources, those who helped, and testing methods used.

4. **My answer now:** This should answer the first step, above. It is the conclusion reached on the basis of the evidence above. Are the conclusions reached validated by the evidence? Can I replicate your methods and reach the same or similar results?

Thus, to be scientific, an investigation must:

- Be observable
- Be capable of being tested
- Be capable of replication with the same or similar results
- Have conclusions able to be verified from the data presented.

Analyse a number of television advertisements which use scientific-looking people claiming, ‘scientific tests show ...’. One will notice that there is no way to find out which scientific tests were conducted, who did them, what methods were used and, certainly, there is no way you can replicate them to see if the same or similar results can be reached. Why not get your class to challenge such advertisements in the news media? Then complain to the Commerce Commission on the grounds of misleading advertising.

In conclusion:

Achieving the requirements outlined in the document, *Science in the New Zealand Curriculum*, is all that is asked of primary teachers in science education. You are not asked to adopt methodology from the NZQA – that organisation is supposed to cater for upper secondary and tertiary sectors. There may be some ideas which meet the needs of your learners but, be warned, if any method pushed by others doesn’t fit what you feel is right for your learners – reject it. Be confident in your being part of a wonderful team of educators. Primary teachers need to be confident they are the best educators in the world, in the best schools in the world.