

But you can't say that!

■ Anne Goldsworthy

Primary science can crop up in the most unexpected places – in the beauty section of *The Guardian* Saturday magazine for example. There I was, flicking idly through the magazine, when my eyes rested on an article about a very expensive face cream. And I mean very expensive – this stuff was £119 for a small bottle. The face cream had been developed by a ‘doctor’ and claimed to make you look years younger in three days. The author of the article looked at the efficacy of the product and found it sadly wanting. Where, you are thinking, does primary science fit into such an article? Well, one paragraph read like this, ‘*The doctor’s representatives had suggested that it would be a great idea to combine his insanely costly cosmeceuticals with an improved diet and regular doses of his peptide powder. But even 8 year-olds know that if you’re doing an experiment, you change only one variable at a time. And even 40 year-olds know that if you drink gallons of water and eat less for a week, you’re going to look better.*’

This comment set me thinking in two ways. Firstly, I felt a satisfied smile creeping over my face; I think there may even have been a hint of smugness lurking there. In the days before the National Curriculum with its emphasis on scientific enquiry (an emphasis that has been supported all the way by ASE, of course), it would have been impossible to say that ‘... even 8 year-olds know that if you’re doing an experiment, you change only one variable at a time’. Now we are at a point where national journalists recognise that children in primary school are busy learning how to set up fair tests and may well have more knowledge of variables than their 40 year-old parents. We have come a long way and we should give ourselves a large congratulatory pat on the back.

Secondly, I started to think about the issue of relevance following the

Wellcome Trust’s report into primary science, *Primary Horizons*. This report, based on a scoping study carried out by Queen’s University Belfast, highlights a number of familiar problems in primary science, such as the lack of teacher confidence, the need for good quality professional development, and fairer funding for resources. However, the report also says: ‘*Ultimately it [primary science education] should seek to develop the sorts of skills that will help young people to become active and informed citizens, as well as equipping them with the underpinning conceptual knowledge. This ... is often known as scientific literacy. Nearly a third of all teachers in the study suggested that the best way to develop children’s scientific literacy is to make science more relevant to their everyday lives.*’ I believe that one of the most effective ways to make science relevant to children’s everyday lives is to equip them with the ability to interpret and question evidence. If we can do this

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well, a few more children would grow up into citizens who would be better able to question spurious claims, as well as recognise valid ones, in all walks of life, including the world of expensive beauty products.

How can we help primary children to question and interpret evidence? The obvious place to start is with their own

evidence from their own investigations and enquiries. We need to push them to say as much as they can about the evidence they have collected, whilst at the same time recognising its limitations. An example of one pupil’s investigation (*Investigations: Making an Impact*; AKSIS INSET Project) illustrates how we could ask children to say more about their evidence. In this investigation Rhys, a year 4 pupil, tested the breaking strength of four different threads by hanging a bucket from each thread in turn. He kept adding weights to the bucket until the thread snapped. His bar chart is shown in Figure 1. There is nothing wrong with his conclusion which states, ‘*The nylon was the strongest.*’ However, the striking thing about this investigation is that two of the threads were very much stronger than the other two. In fact, the cotton and nylon seemed to be almost eight times stronger than the wool and nylon. This shows up very clearly on the bar chart. Most of us would have predicted a difference in breaking strength but not that two of the threads would be about eight times stronger than the two other threads. Rhys does not comment on this part of his evidence and simply states that the nylon was the strongest. However, the question he was investigating was ‘Which thread is the strongest?’ which he has clearly answered, but he has ignored the rest of his evidence. Many of our primary science investigations ask children to find a ‘winner’, for example ‘Which magnet is strongest?’ ‘Which fabric stretches the most?’ There is nothing wrong with children finding the ‘winner’ and for younger children it may be an appropriate response. However, we might want to encourage older children to draw a conclusion that says something about all their results. If Rhys’ enquiry had asked ‘Are all threads the same strength?’, he might have been

encouraged to look at his other results as well.

Another technique to help children interpret evidence is to see if they can recognise the limitations of the evidence by looking at others' conclusions. Imagine top junior pupils had carried out an investigation where they gave small pots of grass seed 1, 2, 3, or 4 drops of water daily and concluded 'The more water you give grass, the taller it grows'. Other pupils could look at that say 'But you can't say that. You only tested up to four drops. That conclusion sounds like the grass would grow taller with a bucket of water poured on every day!' Or if children were investigating objects that were attracted to a magnet, they might conclude 'All the metal things are attracted to the magnet'. The response to that would be, 'But you can't say that. You've only tested steel things. Other metals might not be attracted'. Or if children were investigating arm length of boys and girls and they concluded that 'Boys have longer arms than girls.', others could respond, 'But you can't say that, you've only looked at four boys and four girls. You need to look at loads more than that'. For this sort of work, it helps enormously if there is a good atmosphere in the class where pupils are encouraged to challenge each other's statements in a supportive way. If your class is not quite ready to do this, you can start this type of approach by looking at conclusions from 'another' class, i.e. those made up by you the previous evening.

Alongside the evidence they have collected themselves in enquiries, we

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can also ask pupils to look at secondary evidence. They can consider the conclusions drawn and decide whether they match the evidence or whether they should be challenged. The newly developed Primary UPD8 materials will give you lots of examples of secondary evidence set in exciting, newsworthy

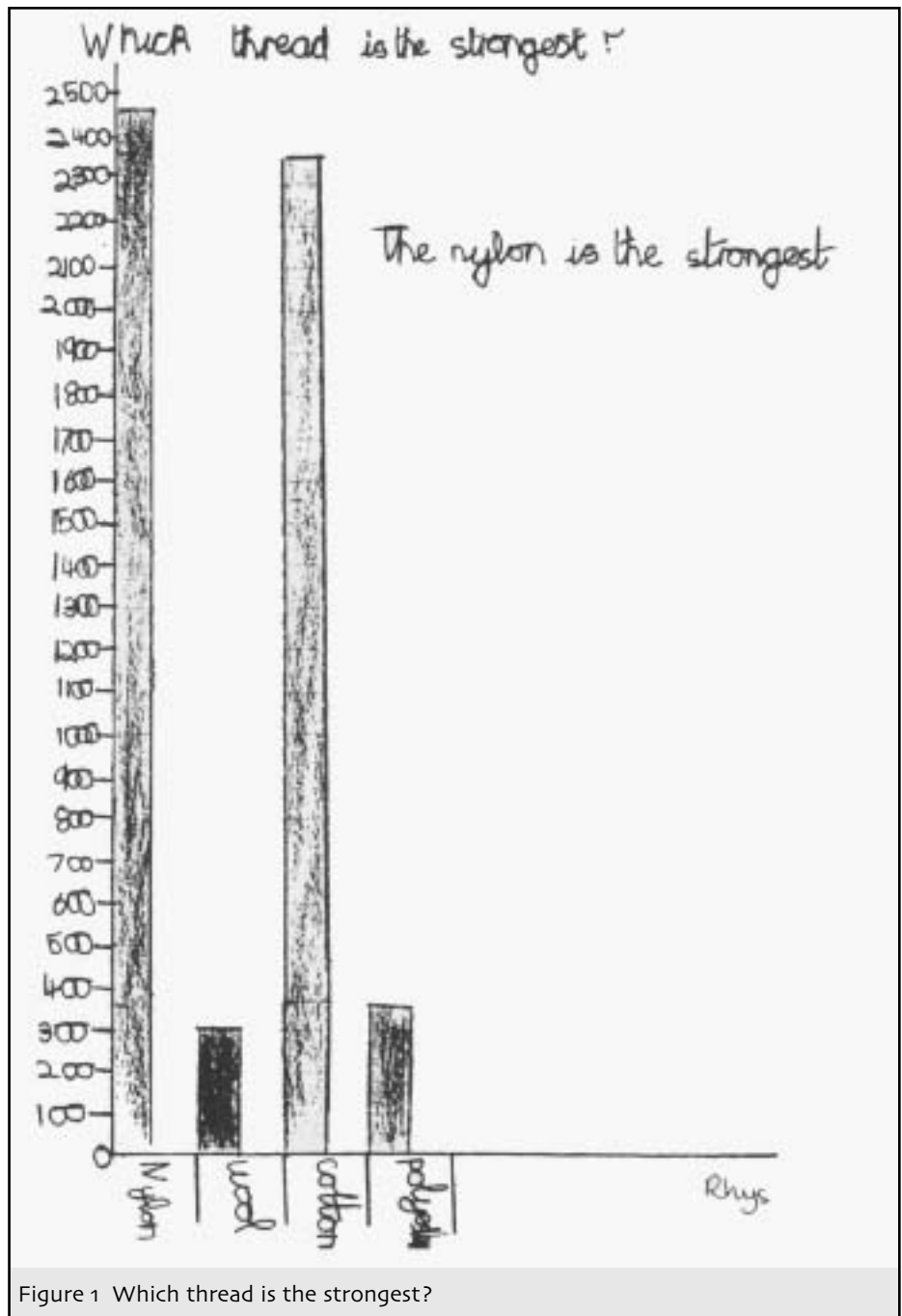


Figure 1 Which thread is the strongest?

contexts. The activities are put over in a way that will grab children's attention and get them arguing about evidence. Have a look at the website (www.primaryupd8.org.uk) and be impressed.

Helping pupils realise how science works is the most important thing we do in science education. If we manage to teach our pupils to question evidence, to spot whether a conclusion matches evidence, and to recognise the limitations of evidence, then we will have equipped them with life skills. And, what's more, they won't have to fork out for that £119 face cream. Now that really will be relevant to them.

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