



The whole idea behind 'what science is' is shaped and formed by experience and teaching (and teachers!). You may feel that science is knowledge and knowledge is power but this must not exclude the skills that go behind being a scientist, as you need these to acquire and support the knowledge. Views of our own scientific knowledge and understanding shift. When some primary-age children were asked about their understandings of the concept of 'living', their responses were a good example of how perceptions change with time. Younger children tended to talk about 'living in my house' or 'my dog lives in a kennel', but as the children got older, and with further classroom teaching, they started to talk about the characteristics of living things.

Try answering the question, 'What is science?' and see how your own answers change: with time; according to your audience; or even with how you feel. Our answers are tailored to the audience – compare the answer given to the small child with that given to the head teacher or science coordinator. Before you answer, your own understanding and beliefs must be clear. The clearer our own understanding, the stronger an argument we can make. For many of us that will initially involve some research and time to reflect.

Let's see how some of our most famous scientists have answered the question:

Science is a way of thinking much more than it is a body of knowledge. (Carl Sagan, 1979)

Real science is a revision in progress, always. It proceeds in fits and starts of ignorance. (Stuart Firestein, 2012)

One thing I have learned in a long life: that all our science, measured against reality, is primitive and childlike – and yet it is the most precious thing we have. (Albert Einstein, 1951)

So can anyone conceive of a life not involving science? Could it be that human beings are so immersed in science that it would be hard to get away from it? No one could read this or play with computers if there was no science. What would life be like? Asking these questions and others goes to

the heart of what we should be teaching in primary school. Encouraging children to wonder, speculate and question are fundamental to their learning and synonymous with science:

The scientist is not a person who gives the right answers, he's one who asks the right questions. (Claude Lévi-Strauss, 1964)

As teachers we should also routinely ask the question 'What makes this activity I am asking the children to do 'science'?' We need to consider the 'versions' of science: school science, pure science, the science of scientists, indigenous science and children's science.

You may think that 'children's science' is close to 'school science', but in reality, it is closer to the 'science of scientists'. 'Children's science' is the child's current explanation of natural phenomena supported by evidence that they have gathered. Their ideas are

not always the same as scientists' ideas, but if they can articulate the reasons why they think the way they do they are moving towards thinking scientifically, even if they have not reached an accurate scientific explanation. This is a scientific way of thinking. 'School science', in contrast, is more about learning what the teacher wants us to know so that we can pass the test or finding the teacher's predetermined answer, rather than exploring, noticing patterns, formulating explanations and

designing investigations that test these tentative explanations. There is, however, a body of people who have for some years been advocating and supporting this latter approach and trying to shift 'school science'. Look at the themed articles in this issue: there is the same underlying message: skills; enquiry; children's ideas and real life.

But it isn't a static picture. You only have to look at the past 50 years of the Association for Science Education to see some of the changes that have been made (look out for the anniversary book soon to be published), or just reflect on your own education and that of your parents, whose science education probably focused much more on learning a 'body of knowledge' rather than a 'way of thinking'. Fifty years ago science in primary schools was intermittent and mainly focused on nature. There is now a greater awareness (if not a universally accepted definition) of the need to 'develop scientists' and to increase scientific literacy, to teach children to question the evidence presented to them, to question media hype and develop their scientific thinking in preparation for their adult lives.

References

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