



So, electricity or electricker? Fascinating as it might be, this quickly becomes a very complex subject. But it is one of those subjects that motivates children – just being able to connect wires to batteries and try to unravel the ‘magic’ that goes on in their own homes by making a bulb light up.

Where did it start? Static electricity was the first thing ‘created’. We have heard about the ancient Greeks rubbing cat fur on a piece of amber – but why did they do it? Was this an accident that led to other ideas – the original scientist? The observation that static electricity ‘attracted’ objects was originally considered to be a form of magnetism, as the ancient Greeks’ only prior experience of attraction like this was with naturally magnetised lodestone. It took from about 600BC to AD1600 for the difference to be distinguished by William Gilbert! However, this action of creating static is what has given us the name for electricity, or to be more exact, the term ‘electron’, as the Greek word for amber is ‘elektron’.

But ‘electricity’ had been experienced before this. People were aware of the ‘bite’ they received from electric fish, which didn’t leave any teeth marks. So began (as with many new and not completely understood phenomena) a round of ‘cures’. Apparently, the ancients got people with headaches to touch electric fish thinking it would cure them! You may smile, but how recently has ‘electric shock therapy’ been used? Indeed, electricity has been used to ‘kill or cure’ many things over time, from killing the turkey for Thanksgiving to playing games involving kissing electrified ladies (Bertucci, 2007)!

So what happened after William Gilbert? From the 1600s, experiments were carried out by a variety of scientists, such as Volta making batteries with pennies and vinegar (1800), Franklin with his damp kites in thunderstorms (1752) and Galvani’s discoveries that our own nerves transmit signals via electricity too (1780s). Then there was Bell and the telephone (1870s), Marconi and the radio (1901) and Edison – or was it Swan? – and

the light bulb (1870s). There have been many controversies about the application of electricity (White, 2001), but it has been around for so long that no one can lay claim to ‘discovering’ or ‘inventing’ it. In fact, it has been around for so long that we take it for granted – can you imagine life without any electricity at all? What would you miss most? Why? This might prove an interesting thought experiment in class!

On to the tricky part. Why is it so hard to teach? What is most difficult to get across? Children

enjoy it, but do they really learn anything?

The ‘source–sink’ model of electricity used by most children and many adults, with the electricity coming

from a source and going to the place where it is ‘used up’, is seen when children draw how to light a bulb, using just one wire from the cell. This model matches the everyday reality they see of one wire to the TV or other appliance. It only comes unstuck when they try to light their own bulb and find that they need to build a circuit. Even when we have taught them that a complete circuit is needed and that more bulbs means they are dimmer if the voltage is not increased, this does not help them make links with their original observations. There is a gap between what is seen in everyday life and what happens with the simple circuitry in the classroom.

This may not be the only issue. Perhaps we will see a generation of children who need support in identifying the ‘source’? With wireless devices and circuitry hidden from view, it may be even harder for children to develop their own ideas of how an electric current flows. Even the idea of a switch may become more difficult to understand with voice-activated technology. This makes the practical element of building circuits more important than ever. Models and analogies take us so far, but they remain separate from reality until we make circuits with our own hands. In short, technology may be robbing us of the ability to be the scientists of tomorrow. Gone are the days when we used to make our own radios and tinker with electrics in the shed. Have we lost the ability to ‘explore’ in the same way as our historical counterparts did? Perhaps the next science club should involve building crystal radio sets or exploring the best element for a light bulb – having a real application for this tricky subject?

References

- Bertucci, P. (2007) Sparks in the dark: the attraction of electricity in the eighteenth century. *Endeavour*, **31**(3), 88–93
- White, M. (2001) *Rivals: conflict as the fuel of science*. London: Secker & Warburg

