



Fancy finding a villain, firing a cannon or filming a movie? The road to scientific enlightenment need never be boring for your class, says **Dr George Forster**...

Why has the number of young people taking up science, engineering, technology and maths (the so called STEM subjects) fallen over recent years? Is it because science is boring? Is it because science is too difficult, because there is too much to cram in to leave enough time for practical activities, because doing experiments is too expensive or even because the primary teacher was not keen on science? None of these is entirely true, nor are they excuses.

Science is certainly not boring. It may be presented in a boring manner, but it's intrinsically interesting as it affects our everyday lives. It's the

practice and is easier in science than in many other subjects, because science is essentially a practical subject.

In fact, teaching science is win-win all the way. It appeals to youngsters' natural curiosity, fun activities are easy to develop and there are loads of ready-made resources available for teachers.

Making movies

As the underlying basis of all science is investigation, asking questions and testing answers, why not get your class to ask some questions of

cinema. Help them to identify science topics within the scenario, guiding them to areas where you know there are easy activities. In this case, perhaps 'how do movies work' and 'what makes corn pop'? Some simple activities to demonstrate these might be:

How do films work?

Make up flip books to show a running figure and explain that the eye collects each picture in turn but that the image of one persists after it has seen the next one. The images run into one

Practical activities are very effective teaching and learning tools and can replace more conventional approaches

basis of how mobile phones work, how food is produced, processed and stored, how we get around and why we are much healthier than previous generations – all of these examples, and many more, can be used to make science exciting and relevant. Similarly, it's no more difficult than any other subject (I would argue it's much easier because it depends on understanding why – once understood you can work out the answers). Practical activities are very effective teaching and learning tools and can replace more conventional approaches. After all, 'doing things' is well-established teaching

ordinary everyday activities? Get the class to think of a scenario – for example, going to the



another building up the moving image. Try getting each student to make a different part of a story and then linking them together. If you have a video camera, show the flip book stories on the screen to the whole class. If the school has a single frame camera such as Digital Blue, make Plasticine models and build up a Wallace and Gromit-type story.

2 Making very odd popcorn

Did you know that if you break the tough skin of corn or soak it overnight before you pop it, the shapes of the popped corn are different – why? When it is heated, the force of expansion of water vapour in the corn overcomes the force of the skin holding the kernel together that makes it pop. If you damage the skin in any way you reduce its strength and the end result is different in each case.

Students love stories

Try using a story to engage your students and then build the science around it. For example, in a course I run called 'Dr Evil's Revenge', Dr Evil is threatening to blow up the Houses of Parliament. Working in groups, the students must identify and find him before the

end of the school day. It involves deciphering a code, matching hairs and fibres, chromatography, making impressions with Plasticine and Plaster-of-Paris and triangulating a mobile phone call.

The concept of locating a mobile phone is relatively simple but opens the possibility of investigating the whole area of science behind mobile communications. Dr Evil makes a phone call that's picked up by three cell phone masts. The task is to locate him. Print out a map of your area, and select three locations for mobile receiving masts. For each mast give the students the radius within which Dr Evil made the call. Get them to draw a circle of the correct size around each mast, explaining how his location is more accurately defined with each circle. Scales can be used to introduce some maths.

Why not get the students to work out their own science-based story and think up some activities?

Leonardo's cannon

Science can be linked to virtually every subject. A wider project on Leonardo da Vinci might include the science behind some of his inventions (many of which would never have worked, by the way), for example, his Archetron cannon. The original was a closed tube of iron which contained some water, a seal and a cannon ball on top of the seal. When placed in a hot brazier the water vaporised explosively, shooting the ball from the cannon.

A working, classroom-friendly model can easily be made from a 35mm film canister (from your local Boots – they still have them) sitting inside a cardboard tube. Put 1cm of water in the bottom of the canister, pop in about 1/4 of a fizzy vitamin tablet and close the lid quickly and tightly. Put the canister in the tube and slide in a ping-pong ball on top. When the pressure from the carbon dioxide, being produced by the reaction between water and vitamin table, is sufficient to overcome the force with which the cap is held on there'll be a loud pop and the ball will fly several metres across the classroom. Have a competition to see which team can design the best cannon to make the ball travel furthest. Work out the right barrel elevation angle to get the best trajectory. Carry out the test several times and use the results to talk about means and the need to repeat experiments.

Start experimenting!

These are just a few ideas to get you started. Some were developed with the East Midlands Science Learning Centre, but there is a Science Learning Centre in your region where you can pick up many more suggestions. You don't have to be a scientist to attend. Come and try your own ideas with other teachers and make science your favourite lesson. It's easy with science: make it fun, make it relevant to the students and include some competition, and while you won't be completely home and dry, it will be a lot more fun for all – you included.

Sign-up for science

George Forster has spent more than 30 years in science communication and is managing director of Boost Education, one of the largest providers of fun science-based courses in the UK. He is a member of several regional and national working groups and spends much of his time developing science centres around the world. For further details of similar activities, he can be contacted at info@boost-ed.co.uk