

'Amazing' physics demos to keep practical science alive

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With school students in England bracing themselves for new-style GCSE science exams that are based entirely on written tests, *Physics World* has teamed up with Neil Downie to put together "five amazing physics demonstrations" that highlight the value and importance of keeping experimentation at the centre of the science classroom.

Downie, who is head of the sensors group of Air Products in Basingstoke and a Royal Academy of Engineering visiting professor at the University of Surrey, has been delivering Saturday science clubs for children for more than 20 years and has picked out his five favourite experiments of all time.

The experiments, which are described in April's issue of *Physics World* and accompanied by a set of video walkthroughs, are simple and quick to carry out and require minimal equipment to get you started.

From "Newton's Three Laws Cannon" to the "Ball River Bobsleigh", the experiments allow students to get creative while, at the same time, providing them with a firm understanding of fundamental physics principles.

In the first video, which can be viewed below, Downie demonstrates "The Vacuum Bazooka", in which a vacuum cleaner is transformed into a missile launcher to propel objects across the room. The video shows the front cover of *Physics World* being used for target practice, with Downie explaining how the experiment illustrates the fundamental

concept of pressure differences.

In his article, Downie describes how his fondness for the five experiments comes from the fact that, with a bit of creativity, each one can be easily adapted to explore physical concepts further.

The "Double Doppler with Train Set" experiment, for example, not only illustrates the principles of ultrasonic waves, but the equipment could also be used to detect sources of ultrasound around us - from rubbing fingers and whistling fluorescent lamps to electronics and clanging metals.

"We tend to focus too much on academic studies and theoretical work, which are only part of the equation. What's vital for creativity and understanding is to handle, design and make things - and to improve them too," Downie writes.

Whether or not students will be recognized for demonstrating creativity remains to be seen. From September 2016, pupils in England will no longer be tested on their practical skills when studying GCSE science; they will instead have their practical knowledge assessed through written tests.

In a separate editorial, Matin Durrani, editor of *Physics World*, states that a new method for testing GCSE pupils' experimental skills was much needed, but questions whether the new system is an improvement.

"Testing practical knowledge via written tests at GCSE level has not been trialled. What's more, the eight practical activities [for GCSE physics] are very narrow and prescriptive. Given the importance of experimental skills in physics, I hope the reforms work - but they are a big step into the unknown," he writes.

Provided by Institute of Physics

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