

# Take your science teaching to the next level: STEM volunteers in the classroom

**Jane Winter describes the impact that STEM professionals could have in the primary classroom, and shares some tips for how to get started**



**Figure 1** Scientist at work: Meeting people from the world of work helps children to understand the relevance of science beyond the classroom

**A**s you have chosen to read this, you are probably enthusiastic about teaching science and you probably teach above average science lessons in terms of children's engagement and progress. You are more likely than the 'teacher in the street' to have heard of Science Capital and to know that, as well as ensuring enjoyment and learning in science lessons, it is important to raise children's aspirations and to help them to understand that science is relevant to their lives both now and in the future. However, I wonder if you have dipped your toe into the wonderful world of inviting STEM professionals (volunteers from science-based industries,

universities, etc.) into your classroom? Are you ready to push yourself out of your comfort zone to work with a stranger and welcome them into your classroom to give your science teaching a whole new dimension? The logistics of finding someone and then arranging a mutually convenient time can appear daunting, combined with fact-handing over control of some of the lesson. So, do the benefits make the effort worthwhile?

## **A little effort reaps huge rewards**

Teachers who have taken the plunge report that working with

STEM professionals leads to deeper engagement and more 'sticky' learning. Remember the proverb 'Tell me something and I will forget, show me something and I may remember, involve me and I will understand'? If you want children to *really* understand that science is done by 'normal' people and is something that they could aspire to, letting them meet and interact with real live scientists is unsurpassed. Moreover, if children see links between the science that they do in school and a real-life context, the experience becomes more meaningful and relevant to their lives. Children often learn more, and retain this learning for the long term.

Key words: ■ STEM volunteer ■ STEM professional ■ Ambassador ■ Science capital

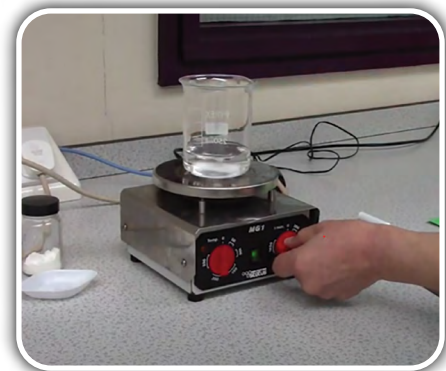
	<b>Potatoes to Plastics (without a STEM volunteer)</b>	<b>Potatoes to Plastics (with a STEM volunteer)</b>
Links to Year 5 (age 9-10) curriculum	Yes	Yes
Cross-curricular introduction	Children read and write about STEM professionals in an English lesson.	As well as reading about STEM professionals, children meet and interview one before writing a report about them in an English lesson.
Introduction to main activities	Teacher tells children about how science can be used to find solutions to environmental problems. She gives the example of extracting starch from potato peel and gives children instructions to do this.	Children meet a scientist who shares some of the solutions to environmental problems that she and her colleagues have been working on. She tells them how to extract starch from potato peel and tells them that she will be coming back to show them what to do with it.
First activity	Class teacher supports children to extract starch from potato peel following instructions from CIEC publication.	Class teacher supports children to extract starch from potato peel following instructions left by the scientist.
Second activity	Class teacher supports children to turn potato starch into bio-plastic following instructions from CIEC publication. She heats the mixture for them in a saucepan on a cooker.	Class teacher and scientist work together to support children to turn potato starch into bio-plastic. The scientist brings in a magnetic hotplate, which she demonstrates to children before using it to heat their mixtures. During the activity she also answers children's questions about her job and shares anecdotes from her experience.
Final investigation	Children test their bio-plastic and send their findings to a fictitious company. (If the findings are sent to CIEC, the children will hear back from the 'company' who will thank them for their contribution to research and development.)	Children test their bio-plastic and send their findings to the scientist. She promises the children to pass on their findings to the Research and Development department of her company. In due course, the children hear back and are thanked for their useful contribution.

**Figure 2** An example of a science activity with and without a STEM volunteer

## A tale of two science lessons

Figure 2 uses CIEC's latest primary science publication, *Potatoes to Plastics*,

to exemplify the differences between carrying out a set of science activities in the classroom both with and without the support of a local STEM volunteer. As we already know, lessons without



**Figure 3** A STEM professional can bring specialist equipment into the classroom. Here, a magnetic hot plate is being used, which simultaneously heats and stirs the liquid

the input of STEM professionals can be engaging, effectively cover the science programme of study and support children to understand that science has an important role to play in their lives. This example links closely to the Year 5 'materials' strand of the curriculum and is also topical, as it shows how a waste product, potato peel, can be turned into a biodegradable alternative to a fossil fuel-based product. One might have thought that it would be hard to improve on this science experience in terms of engagement, learning and relevance.

However, Figure 2 demonstrates how the input of a STEM professional can take the learning experience to the next level, in many ways. Getting to meet a real-life scientist does more to dispel stereotypes than any other experience that you can give children in school. Furthermore, if that scientist tells children about how they use aspects of science familiar to the children in their work, the school curriculum becomes more meaningful to the children, raising Science Capital whilst increasing long term retention of learning. Teachers often tell us that when they are reviewing the year with children in July, it is the work with STEM volunteers that children recollect most enthusiastically, which leads to secure learning that can be built upon in subsequent years.

## First: catch your scientist

The easiest place to try to locate a STEM professional can be within

It is second nature for teachers to use a variety of tools to help children learn. Teachers choose their vocabulary carefully, repeat instructions in a variety of ways and use non-verbal reinforcement to clarify meaning. This reduces the cognitive load for children as they grapple with fresh ideas and concepts. However, it is not possible to pass this experience on to visitors when we welcome them into our classrooms. I once attended an assembly run by an enthusiastic and well-meaning engineer from a local power plant. Sadly, even the teachers in the audience didn't understand most of what he said, let alone the Key Stage 1 (age 5-7) children sitting in the front row!

CIEC's 30+ years of experience providing training for scientists and engineers to work with primary school children can help. CIEC's team supports potential volunteers to develop the skills to enable them to communicate effectively and confidently in the classroom. CIEC's CPD team identifies activities that will make strong links between the primary science curriculum and the science that takes place in a particular workplace (see Figure 5). This service is often commissioned by companies who would like to develop the effectiveness of their schools' outreach team. CIEC can also support groups of schools that want to get the best possible results from inviting STEM professionals into their classrooms.

When volunteers have developed their role in partnership with CIEC, the impact on the children has been very high. STEM professionals also tell us how much more meaningful the interaction is for them, as a result of CIEC support. They feel more confident going into the classroom, as well as having the satisfaction that their more skilled approach is having a positive impact on children's lives. Moreover, collaboration with CIEC maximises the development of skills that they take back to the workplace – benefiting both themselves and their employers.

**Figure 4** Lightening the load with CIEC

the school community. Send a letter to families and ask colleagues about relatives or friends who have STEM careers. This approach can lead to two different groups of people

coming forward. Firstly, you may have offers from people who use the products of science at work. For example, hairdressers use a range of chemicals that would be harmful if the

Real-life STEM application	CIEC publications	Link to the National Curriculum
Aeronautical Engineering	<i>Feel the Force</i>	Forces
Growing the microorganisms needed to make antibiotics	<i>Cough Syrup</i> <i>Medicines from Microbes</i>	Living things
Environmental Science	<i>Sustainability or</i> <i>Potatoes to Plastics</i>	Living things and their habitats
Agronomy	<i>Turf Trouble</i>	Plants
Power Plant Engineering	<i>Generating Electricity</i> <a href="http://www.ciec.org.uk/resources/generating-electricity.html">http://www.ciec.org.uk/resources/generating-electricity.html</a>	Electricity
Veterinary Science	<i>Medicines for Pets</i>	Materials

**Figure 5** Bridging the gap between real-life applications and primary science

correct procedures were not followed. Motor mechanics need to manage the use of products in engines as well as understand the physical laws of motion. If you have volunteers in this group, try a cross-curricular English-focused activity. Groups of children interview these volunteers about their jobs and share written reports. The quality of children's work tends to be higher when children plan these interviews in advance, planning questions that they would like to ask and giving volunteers notice of the questions.

Children do benefit from meeting a range of people who use science in their jobs, as it helps them to understand the relevance of science to their lives and raises their Science Capital. However, the focus of this article is on a second group of volunteers. These are people who need STEM qualifications to do their jobs, including scientists and engineers. When asking for such volunteers, you may be surprised by the range of careers represented in your school's wider community. In my own experience, I have met a quality control specialist working in a food factory, a radiographer from a hospital, an environmental scientist working for the council and an agronomist who supports farmers to get the best yields from their crops. You cannot really have too many STEM volunteers as, ideally, every class in the school should get to work with at least one STEM professional every year – so don't turn anyone down!

Making use of contacts is a good first step towards developing the school's broad link with the STEM world of work. However, to find the exact scientist who you want to carry out a specific activity, contact a local organisation that employs STEM professionals, such as a science-based industry, a university or a military station. If you are lucky, you will find that the organisation that you have approached encourages their employees by allocating time each year to participate in schools' outreach. Companies wish to support their local community, whilst raising awareness of what the company does and the range