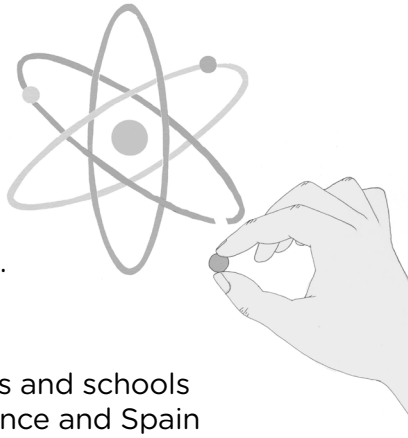
PERFORM toolkit: why should you use it?

This toolkit provides science teachers with a series of resources to help stimulate discussion on science and society in the classroom. Resources are most suitable for students aged 14-16.

Alongside the development of knowledge and understanding of the fundamental concepts of science, the English curriculum also proposes that students should gain an insight into 'working scientifically' and an appreciation of the relevance of science to their everyday lives (Department of Education, 2015). The Spanish curriculum further states that students should conceive scientific knowledge as integrated knowledge and should know how to critically evaluate the contribution of science and technology to our society (LOMCE, 2013). Further complimenting these statements, the French curriculum expresses that students should be prepared for responsible citizenship, especially in the areas of health and the environment by gaining an understanding of advances in technology and economics, in order to assume the appropriate social and ethical responsibilities as citizens (Ministère de l'Éducation nationale, 2015).

The activities and resources in this toolkit have been designed to help students develop a set of transferrable skills as well as a more reflective knowing of science in which they consider purposes, values and how science becomes reality.

This toolkit contains a collection of short *Meet the Scientist videos* which introduce students to real researchers in the early stages of their careers. An accompanying document suggests how teachers can use the videos to inspire students to consider a career in science for themselves. A set of *Performing Science Cards* offer instructions for a selection of quick, interactive performance-based activities and discussions, based on ethical questions. All the resources in this toolkit are designed to support learning on a wide range of scientific topics across the secondary science curriculum. *Practical guidance* is provided to help you make the best use of these resources and activities in your classroom.



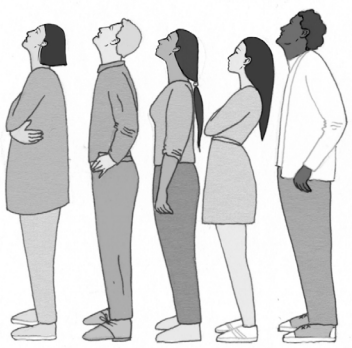
This toolkit distils ideas and techniques used during teacher training sessions and schools workshops that were developed during the PERFORM project in the UK, France and Spain in 2015-2018.

Enhance transferable skills

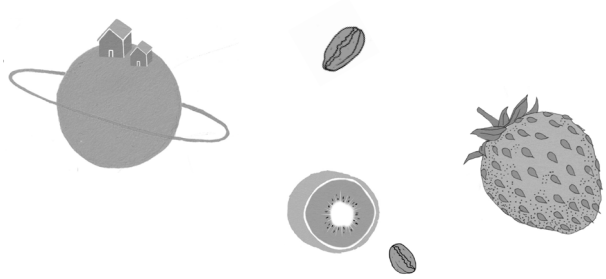
The performance and discussion-based activities in this toolkit will help students to develop key transferable skills, benefitting their engagement with science and also enhacing their learning in other curriculum areas. Crucially these activities will help students to become more informed citizens; able to critically engage with the natural world and an increasingly 'information-rich' and technological society.

Developing transferable skills compliments the 'working scientifically' element of the science curriculum in England, which expects students to:

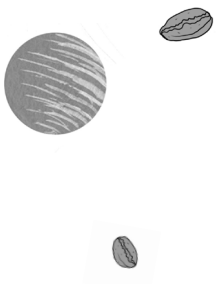
- appreciate the power and limitations of science and consider any ethical issues which may arise.
- explain every day and technological applications of science; evaluate associated personal, social, economic and environmental implications; and make decisions based on the evaluation of evidence and arguments.
- evaluate risks both in practical science and the wider societal context, including perception of risk in relation to data and consequences.
- recognise the importance of peer review of results and of communicating results to a range of audiences (Department of Education, 2015)



Transferable skills developed through discussion around science and its link with society



Communicating ideas	Public speaking
Considering ethics	Emotional intelligence
Interrogating sources	Critical reasoning
Anticipating risks	
Examining consequences	
Critical thinking	
Collaborative decision making	Teamwork
	Collaborative problem solving
Informed problem solving	Listening skills
Reflective thinking	Self reflection
Creative thinking and innovation	Imagination
	Innovation
Sense of Initiative	Confidence
	Using Initiative
Building a sense of responsibility	Leadership



Transferable skills developed through performance

Contents

This toolkit consists of three main teaching resources: Performing Science cards, Meet the Scientist videos, and Guidance Notes for integrating these approaches into your lessons. Each of these can be used as a standalone resource or in conjunction with other components of the toolkit.

Performing Science activity cards

6 specially-created artworks each illustrate an ethical question relating to science and society. Alongside each artwork and corresponding question is a short performance-based or discussion-based activity and an outline of how to facilitate it within a classroom. A Science and Society card provides suggestions for deeper learning relating to the same ethical question.

Meet the Scientist videos

5 bite-sized videos each introduce an early career science researcher from the UK, France or Spain. These 5 minute long videos are designed to provide personal and relatable insights into careers in science and stimulate conversation about current scientific research and its potential implications for society. Each video is divided into two sections: in the Meet the Scientist section the researcher speaks about their own identity and career and in The Bigger Picture they reflect on ethical and philosophical issues related to their field of research. An accompanying guide provides further information on each featured researcher and suggestions for how to use the videos in the classroom.

Guidance for integrating these approaches into your lessons

Where should you start with integrating performance techniques into your classroom? How could you begin to introduce students to the bigger picture and how science affects us all as citizens? This section presents advice from performance and philosophy in schools practitioners from the PERFORM project.

Guidance on integrating performance techniques into science lessons

PERFORM invited teachers to use performance-based exercises to help explore issues around scientific research and its impact on society. This toolkit invites you to do the same. During the PERFORM training, we discussed some of the challenges teachers might face in using performance exercises in science lessons. Below are some suggestions to help you overcome these barriers and try out performance methods to enhance your teaching.

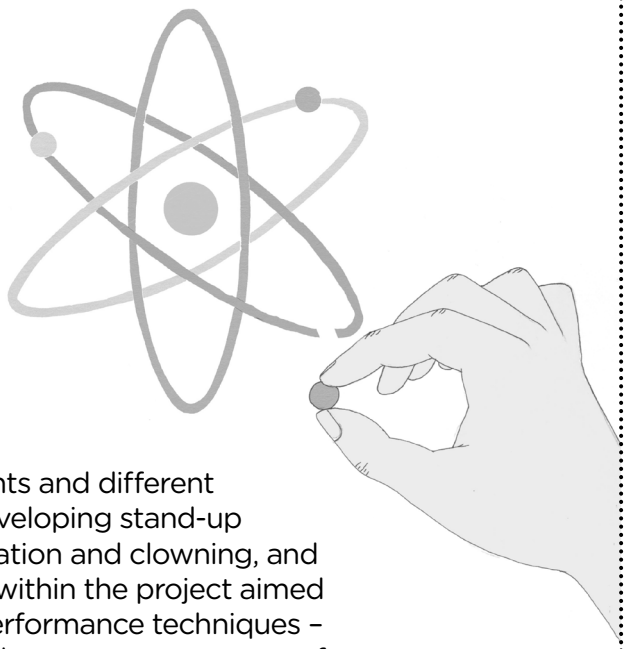
"I am worried that introducing performance will lead to a deterioration of behaviour in my lessons."

- Use of performance activities can actually help students to adopt behaviour that is positive and constructive for learning. Playful interactive teaching can help engage students with curriculum content.
- Using role play, the teacher can choose to take on a character through which they can control behaviour: a harsh Quiz Show Host or exacting TV interviewer, for example.
- Many performance exercises can include an element of scoring and reward. A reward or a sense of competition can help to focus students on the task at hand.
- In order to minimise disruptive responses to new performance elements in the classroom, start small. When introducing a new game or exercise, perhaps just do it for a few minutes at the end of a lesson.

"I already have so much to fit into my lessons. How can I ensure that these techniques enhance what they are learning and don't detract from the curriculum?"

- Many performance exercises are designed to re-focus and re-energise groups. As such, the rest of your teaching will benefit from their inclusion.
- Use the performance exercises as a way to recap and revise. This will also bring to your attention where there are gaps in knowledge and misconceptions.
- Some performance games are very short and by their nature can fit easily into lessons; these activities are designed to be short, adaptable, and easy to slot into a lesson.

What was PERFORM?



PERFORM was a 3-year EC research project during 2015-18 which investigated the effects of using performing arts methods to develop a deeper engagement with science subjects in selected secondary schools in France, Spain and the UK. It brought together students, teachers, performance artists and early career science researchers to develop interactive performances and engage in discussions about science and society.

Partners in each country worked with secondary students and different performance approaches; in Spain they focussed on developing stand-up comedy monologues, in France they explored improvisation and clowning, and in the UK they created science busks. Teacher training within the project aimed to build confidence in using general and easy-access performance techniques – building on the use of narrative, humour, role play and character - as a means of opening up dialogue on the relationship between science and society within the classroom.

Storytelling and drama are engaging ways of helping people to understand the societal and ethical implications of scientific research and to explore what that means for them on a personal level. Participants in PERFORM worked with performance-based techniques to reflect on their own role in the interaction between science and society, and the values embedded in the EC framework of Responsible Research and Innovation (RRI). RRI values underpin the RRI approach that anticipates and assesses potential implications and societal expectations with regards to research and innovation, with the aim to foster the design of inclusive and sustainable research and innovation.

EC Horizon 2020: Responsible Research and Innovation

PERFORM philosophical discussion workshop, Bristol UK 2017

PERFORM performance training, Bristol UK 2017

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