

# See Through Science

Alex Farrer and Paul Tyler developed and wrote *See Through Science* to encourage use of photographic images to inspire and engage children to ask scientific questions

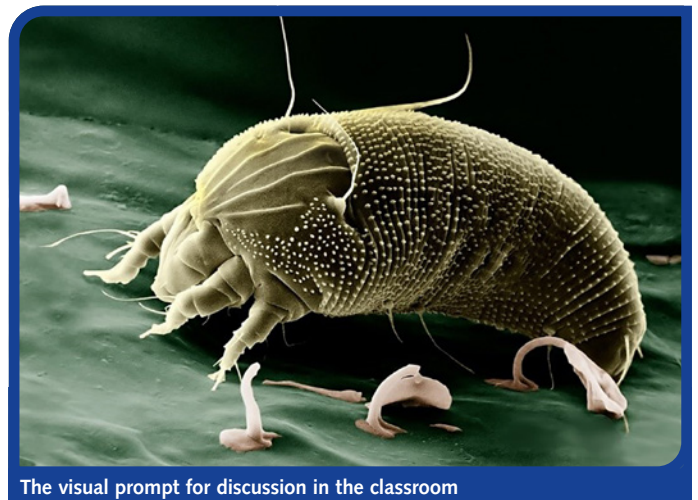


**Keywords** Image, Observation, Questioning, Discussion

*See Through Science* is an exciting new research-based resource from the Primary Science Teaching Trust (PSTT), which uses inspiring photographic images to stimulate scientific thinking, questioning and discussion.

It includes a detailed teacher's guide and a downloadable image pack with inspiring images, key questions, bookmarks, placemats, teacher information and suggestions for follow-on activities.

The original concept for *See Through Science* came from observing the way that photographic images stimulated scientific curiosity in both children and adults, starting discussion and leading to them asking more questions and engaging with science in a positive way.



The visual prompt for discussion in the classroom

# See Through Science

## What is this?

Decide on a yes/no question to ask to help you find out.

Are you sure?

Are you really sure?

Give 3 scientific reasons to convince us that you are right.

# Developing scientific skills

## Why observation?

Human beings have an innate curiosity and an ability to communicate and discuss complex ideas. Through our evolution, we have tried to make sense of the world around us, explain its past and predict its possible futures.

We observe things happening around us, often in complete awe, and ask questions... Why does the moon look different every night? How do flowers know when to grow? Where do stars come from? What happens to the water in a puddle?

We find ways to answer our questions, and then ask more questions with increasing complexity to build our knowledge of the world around us. We call this process 'science' and, without it, we wouldn't be where we are today. In simple terms, without observation and questions there is no science, and without science there is no progression in our understanding of how everything around us works, and how it interacts with everything else.

The skills of scientific observation, scientific questioning, discussion and debate need to be taught explicitly. Children then need lots of opportunities to practice their skills and realise that the same process can be applied to just about anything. *See Through Science* brings scientific observation, questioning, discussion and debate together through the use of carefully selected, inspirational images and prompts to support teachers in class.

## Why questions?

Questions are the starting points and foundations of science and, if we are going to continue to develop our understanding of pretty much everything, we need more people asking more questions (Chin & Osborne, 2008). Research suggests that, on average, teachers ask

between 300 and 400 questions a day, whereas children ask one content-related question a week (Graesser & Person, 1994; Levin & Long, 1981). What is it like in your classroom? How can you encourage your children to ask more questions?

The starting point for improving questioning in class is developing a safe environment and classroom ethos where children are happy to ask questions without fear. Some direct instruction and good modelling of asking good questions is needed, as well as repeated opportunities for the children to formulate their own questions in different contexts.

Modelling how to rephrase questions so that there is a measurable aspect to them will help children to generate investigable questions themselves. From these, they can then make hypotheses and predictions based on their observations and prior knowledge.

### Good scientific questions:

- have real answers. The answer can be as simple as 'yes' or 'no', or it can be more detailed;
- are testable. You can do an experiment or take measurements to find the answer;
- are linked to a prediction or a hypothesis. This does not have to be correct; sometimes the investigation you carry out will show that your hypothesis is false; and
- are interesting!

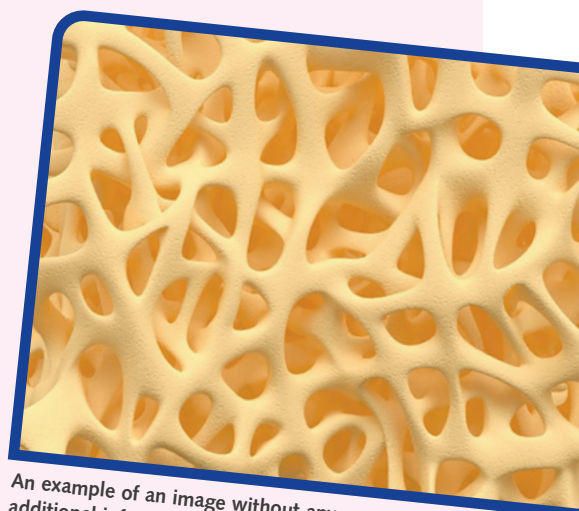
## Using See Through Science

There are two parts to *See Through Science*: the Teacher's Pack and the Image Pack. The Teacher's Pack contains a detailed guide to using the resource, as well as the rationale for the design and all the research behind it. There are examples of how teachers have used it in practice and additional activities for building pupils' observation and questioning skills.

The downloadable Image Pack contains fifteen high-resolution images that cover a wide range of areas of science. They are only loosely curriculum-linked, so teachers have flexibility in how and when to use them and they can also be used in a number of countries.

A copy of each image is provided without a question attached. This might be displayed when children are coming into class so that they can be intrigued and come up with their own questions and ideas. As teachers overhear initial discussions and get an idea of children's thinking, they may well identify misconceptions and ideas for future lessons.

A copy of each image is also provided with a key question to use in class or in assemblies, so that the teacher can support the children to develop their questioning and discussion skills



An example of an image without any additional information

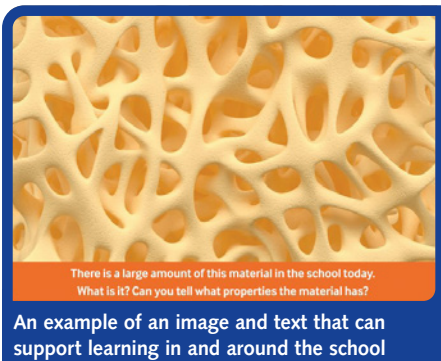


The image with a key question for discussion

Examples of key questions include:

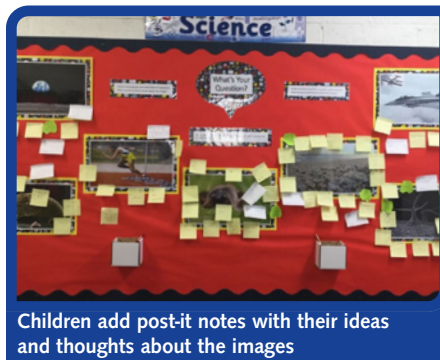
- Which is the odd one out?
- Which 5 scientific words would you choose to go with this photo?
- What are the differences between these two images?

A copy of each image that can be used without teacher support is also included, for example, for use in the lunch queue, in the playground, on the school website, in newsletters or where parents are waiting to collect their children at the end of the day.



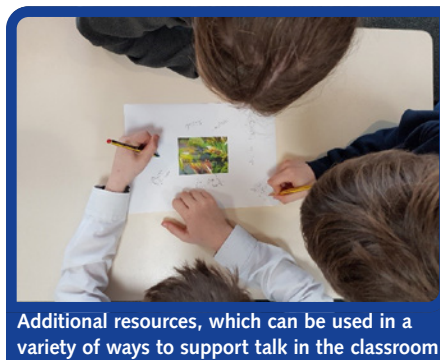
An example of an image and text that can support learning in and around the school

Some *See Through Science* users have encouraged the use of post-it notes or whiteboard pens to gather children's ideas.



Children add post-it notes with their ideas and thoughts about the images

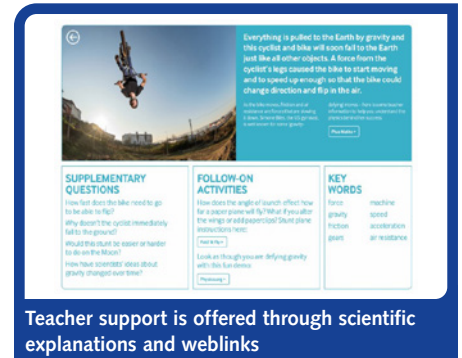
There are additional support resources in the Image Pack: printable placemats and science vocabulary bookmarks are designed to support group discussions, either in paper form or by using tablets.



Additional resources, which can be used in a variety of ways to support talk in the classroom

Teacher feedback stated that teachers might be concerned about not 'knowing the answer' and might feel vulnerable about their own scientific knowledge when asked to explain some of the images. Each image is therefore accompanied by a scientific explanation and a

weblink for teachers or children to use to find out more. This is designed to give teachers the confidence to explore the images in a more creative way with the children.



Teacher support is offered through scientific explanations and weblinks

The supplementary questions and follow-on activities are also a key part of *See Through Science*. Each image links to follow-on practical activities, so that teachers can support children to turn their questions into enquiries. The weblinks also help teachers to ensure that the interesting discussions prompted by the photographs lead to hands-on pupil enquiries.

Many teachers already use a wide range of images to support their teaching and these are easy to find with a simple web search. However, having experienced the frustration of looking for that 'perfect' photograph to use, we wanted to give teachers a quick way to find and use inspiring photographs in their science topics.

*See Through Science* gives answers and ideas, opportunities and suggestions to promote science talk in the whole school community, improves questioning and discussion skills in children, and supports teachers in really thinking about how to develop those questioning and discussion skills.

## Reasons to use *See Through Science*

- Ignites children's curiosity
- Increases understanding of context-specific scientific vocabulary and broadens scientific understanding
- Promotes debate about scientific issues, encouraging children to collect evidence from observations to justify their opinions
- Explores exciting worlds, from the microscopic to inaccessible places on Earth and the far reaches of the Universe
- Encourages precise observation of scientific detail
- Provides opportunities for children to develop their thinking skills
- Grows science capital by developing positive attitudes to science
- Introduces lessons in an intriguing and engaging way, where answers are not immediately obvious
- Assesses prior knowledge and addresses misconceptions that children have about many scientific phenomena
- Develops teachers' confidence to facilitate discussions in science

