Bright Ideas Time

What is Bright Ideas Time?

The AstraZeneca Science Teaching Trust (now the Primary Science teaching Trust (PSTT)) funded a two-year Conceptual Challenge in Primary Science project (2002-4) at Oxford Brookes University involving 16 Oxfordshire primary schools.

The **Bright Ideas Time** was developed as part of this project and offers strategies to encourage pupils to develop their thinking though talking about science in a dedicated discussion slot. Short, focussed discussions using a 'discussion prompt' to stimulate thinking and talking and encourage the children to share their ideas were developed. The 'discussion prompts' included:

- **Odd One Out**
- **PMI (Positive Minus Interesting)**
- **Big Question**

Bright Ideas Time is suitable for children of all ages and abilities. It does not need to take more than 10 minutes and can take place at any time in the lesson. The classroom ethos is important so that all ideas are valued, and it is acceptable for pupils to take risks in their thinking and sometimes to be wrong.

Odd One Out

This is probably the easiest Bright Ideas Time for teachers to try and children to access. It was developed by Mike Dennis whilst working with Science Oxford.

The **Odd One Out** is chosen to link to the theme of the science lesson. Pupils are shown 3 or 4 different pictures (or real objects whenever possible) and given a couple of minutes thinking time. Then they are asked to say which is the odd one out and why. The 'why' is key – the pupils justify their reasoning and so reveal their thinking. The pictures or objects are chosen so that there are no right or wrong answers. From the children's responses, teachers can identify common misconceptions and gain an insight into the children's conceptual understanding.

There are many ways of using an **Odd One Out**:

- Ask pupils to select and justify one object as the Odd One Out and explain why.
- Ask pupils if they can find a reason for each of the objects to be an Odd One Out.
- Sometimes it is helpful at the beginning of a topic (before teaching) to use an Odd One Out activity and repeat the same activity towards the end of the unit of teaching. The teacher could make notes on differences in pupils' responses to show progression in learning.

An example from Freeland Primary School:

In this example, the teacher could identify some pupils' misconceptions: humans are not animals; cats have 9 lives! Also, the teacher could identify that one child has a good grasp of science knowledge, knowing that a bird is not a mammal.

Top Tips:

Make sure that all the children know what the pictures or objects are.

You could ask the pupils to 'pair share' before starting a class discussion. This may give confidence to reticent children to share their ideas.

Encourage the children to be as creative as they wish as long as they can provide a reason.

The Odd One Out prompt should link directly to the subject area being taught in the science lesson and can be used as an elicitation task or an Assessment for Learning tool.

Examples of **Odd One Out** ready to use in the classroom are available on the PSTT website. Once you have tried a few, you might like to make your own to suit the topics that you are teaching.

PMI

De Bono and Fisher are amongst many researchers who have developed methods to encourage pupil's thinking. PMI is one of these.

The pupils are given a scenario – a statement – and then consider, in turn with a few minutes on each:

P: the positives

M: the minuses

I: the interesting associated ideas

An example from St. Andrew's Primary School:

Scenario: People have their own plant-like green skin, so they can create their own food in sunlight

Pupils' PMI responses:

P - Poor people wouldn't starve

M – You might not be able to lie still to sunbathe – you'd get a sugar rush and have to run around!

I – Would diabetes be a problem or not? Would you not need sleep?

In this example the pupils demonstrate their current understanding of the purpose of photosynthesis, and their ability to apply their understanding in a way that provokes further discussion. Science is a creative subject and PMI activities allow pupils' imaginations to play a full part in science lessons.

Top Tips:

Children could share their ideas in pairs or small groups before opening the discussion to the whole class.

Teachers may scribe pupil's comments to collect evidence of children's conceptual knowledge as well as their thinking and reasoning in science.

Children may sometimes like to jot their ideas on a whiteboard before discussing with others.

Examples of **PMI** ready to use in the classroom can be downloaded from the PSTT website.

Big Question

Asking a **Big Question** offers teachers an opportunity to find out the depth of their pupil's thinking and offers pupils an opportunity to express their understanding verbally. It is a very useful strategy to identify the next steps for teaching and learning. You may wish to show a picture, an object or a simple demonstration of a process to engage the pupils and to support your question.

An example of a **Big Question** from Rush Common Primary School:

Over time a seedling grows into a large tree.

Where did the mass of the large tree come from?

Pupils' responses:

'The roots drink water and eats the nutrients to keep it alive and grow.'

This pupil knows that plants acquire water from the soil through the roots but has confused minerals (which are dissolved in the water and enter the plant through the roots) with. Does this pupil know anything about photosynthesis?

'The tree weighs more because of food and water it has eaten in past years. The tree doesn't have a mouth, so the grass collects all of the food and water then it goes down to the roots also the tree likes rain better than house pipe water.'

This pupil has revealed a misconception: that the grass is somehow supporting the tree.

'The leaves suck in the sunlight and convert it to energy, using the chemical, chlorophyll. This process is called 'photosynthesis.'

This pupil has applied his/her knowledge of photosynthesis but has revealed a misconception: leaves 'suck' in the light. Perhaps the next steps would be a conversation about how light travels and an investigation to look at the top and under sides of leaves to see where most chlorophyll might be situated.

'It has come from the branches.'

This pupil knows that the branches make up most of the mass of the full tree (rather than the leaves). Perhaps this pupil has interpreted the question differently and the teacher needs to ask further questions to ascertain the pupil's understanding of photosynthesis and transpiration: Humans get heavier because they eat food and drink, but how does the tree get its food?

Top Tips:

Asking a **Big Question** before a new unit of work is taught reveals children's current understanding and is a great elicitation task.

Asking a **Big Question** after teaching a unit of work is a useful assessment tool. You may wish to scribe some pupils' comments as evidence of their conceptual understanding. This can be particularly useful for children who have poor literacy skills.

Some pupils may show more understanding when the **Big Question** is reframed or reworded.

Examples of **Big Questions** ready to use in the classroom can be downloaded from the PSTT website. The examples are accompanied with some subject knowledge so that no one need be afraid of asking Big Questions.

What impact does the Bright Ideas Time have on pupil's learning?

The teachers taking part in the original Conceptual Challenge in Primary Science project (2002-4) adapted their science lessons in the following ways:

- More emphasis on pupils' independent scientific thinking
- Increased time within lessons spent in discussion of scientific ideas using **Bright Ideas**
- More focused recording by the pupils so less, but better writing
- More time for hands-on, practical investigations

A controlled trial of 32 English primary schools suggested that this creative approach to primary science, with an increased focus on thinking, doing and talking, improved pupils' attainment in science. The details of this trial can be found here.

In 2012-15, the Educational Endowment Fund (EEF) funded Science Oxford and Oxford Brookes University to develop this work further in the **Thinking, Doing, Talking Science** project (TDTS): encouraging teachers to help children develop their thinking skills through science, using the content of the science curriculum. In an initial efficacy trial of 40 schools, TDTS pupils made three additional months' progress in science, on average, compared with pupils whose teachers did not receive TDTS training. There was a particularly positive effect for girls and pupils with low prior attainment.

A second effectiveness trial of 205 schools has found no evidence of an impact on pupils' science attainment on average, though pupil interest in, and self-efficacy in science was increased. Details about the TDTS project can be found here.

The EEF are exploring options for a scalable model that maintains the impact seen in the first trial.

Other developments

The Wellcome Trust developed **Explorify** as a resource for schools. They have drawn upon the evidence from the Thinking, Doing, Talking Science project by including examples of the Odd One Out, PMI and the Big Questions in those materials. Explorify is now supported by PSTT and STEM Learning.

Bright Ideas and other PSTT-funded work from Oxford Brookes University is described in **Creativity in Primary Science: Illustrations from the classroom**. This book is also free to download on the PSTT website.