Developing talk in the primary science classroom

Jo Moore writes about how talk is encouraged and used to support learning and teaching

Keywords Talk, Dialogic, Oracy

Our starting point

Encouraging children to explain their science learning in writing is never an easy task.

It was in discussing how we tackle this that led our group of North London schools to develop a range of strategies and resources to promote science talk in our classrooms. We concluded that, before we could expect children to write, they needed to be able to explain their understanding verbally and this should be our focus.

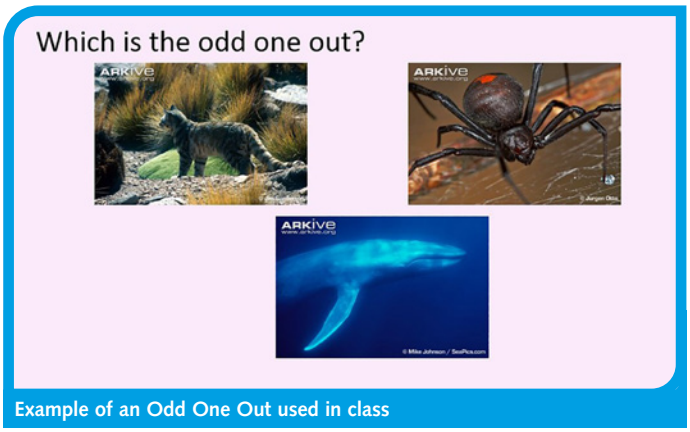
Research conducted by Mercer *et al* (2009) looked at dialogic teaching in the primary science classroom and concluded that '*children are rarely offered guidance or training in how to communicate effectively in groups…Many children may rarely encounter examples of such discussion in their lives out of school – and teachers rarely make their own expectations or criteria for effective discussion explicit to children*'. This was certainly true of my school and, as a result, we began by using their research findings to develop rules for talk in all our classrooms (see Dawes & Sams, 2017).

Once we had achieved this, we focused on different techniques to develop talk and higher order thinking within science lessons. Some come from the *Thinking, Doing, Talking Science* project developed by Oxford Brookes and Science Oxford, and others are techniques found regularly in literacy lessons.

This article aims to outline these techniques, which work well with children across the primary age phase (age 4-11) and could also be used in the secondary setting (age 11-18).

Odd One Out

Show the children three carefully chosen images that fit with your science topic and ask them to decide which is the odd one out. Importantly, there is no right or wrong answer, so children soon become confident in expressing their opinions without fear of making a mistake. The key is that children give reasons for their answers and listen to the variety of opinions within the classroom, understanding that there are many different answers. This is also a very useful assessment tool for teachers – for example, at the beginning of a unit it can indicate what children already know and the vocabulary they can use. Similarly, later in a unit, teachers can assess what the children have learned.



Example of an Odd One Out used in class

The Wellcome Trust's excellent Explorify website (explorify.wellcome.ac.uk/) has some great examples.

TOP TIP

Expect any discussion to take 10 to 15 minutes, giving children individual thinking time at the beginning and then a chance to talk to a partner before opening it up to the class.

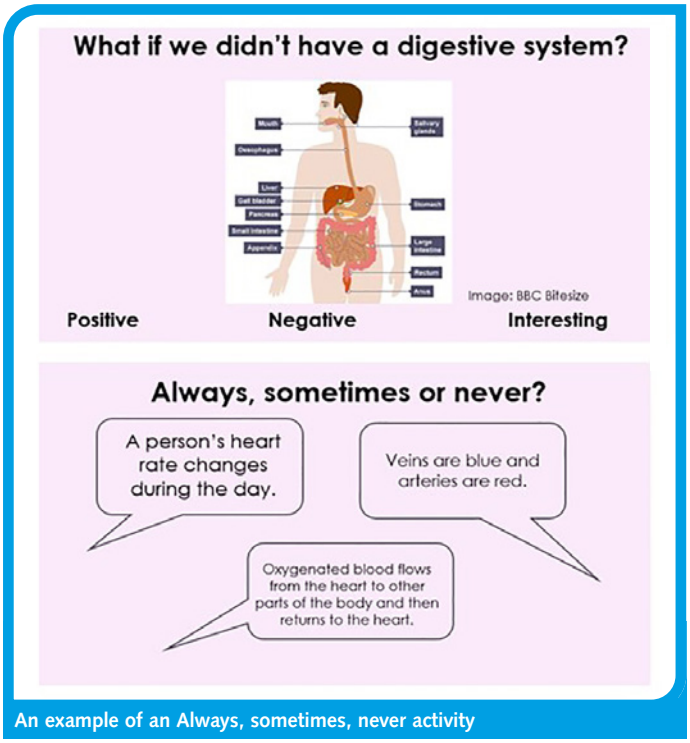
Child 1: 'I think the cat is the odd one because it has four legs'

Child 2: 'I think the spider is the odd one out because the other two are mammals'

Teacher: 'Can anyone think why the whale might be the odd one?'

Child 3: 'It doesn't have any legs and it is the only one that lives in water'

What if.../Always, sometimes, never



An example of an Always, sometimes, never activity

Teacher: 'Who can think what would be positive about not having a digestive system?'

Child 1: 'I wouldn't have to spend time eating. Perhaps we could be like plants and just use oxygen, water and sunlight to make our food'

Child 2: 'We wouldn't need to go to the toilet'

Teacher: 'How about the negatives?'

Child 3: 'We would not have the energy to do anything if we didn't eat'

Child 4: 'We would only be able to eat soups, or other foods that don't need breaking up by our body'

Child 5: 'It would be boring if we never needed to eat – what would happen to all our favourite food?'

These again are techniques for developing higher order thinking skills in the science classroom and can take place during a science lesson, or in a spare ten minutes during the day.

What if... can be used with any topic and children need to come up with positives, negatives and anything that might be interesting. I always really enjoy the children's comments and they never fail to surprise me with their ideas. For example, a discussion about 'What if there was no electricity?' developed into a discussion about mobile phones and how children thought not having a mobile could be a positive, as their parents would not be on the phone all the time and would have more time for their children.

TOP TIP

Always give the children time to discuss with a partner, or in a group of three, before any class discussion, as this helps to develop their confidence.

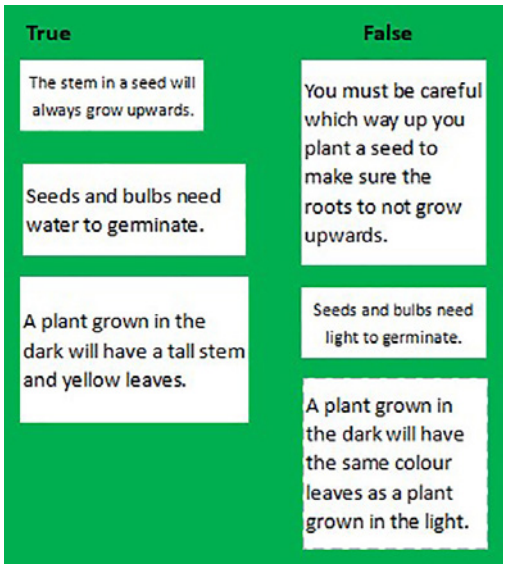
True or false

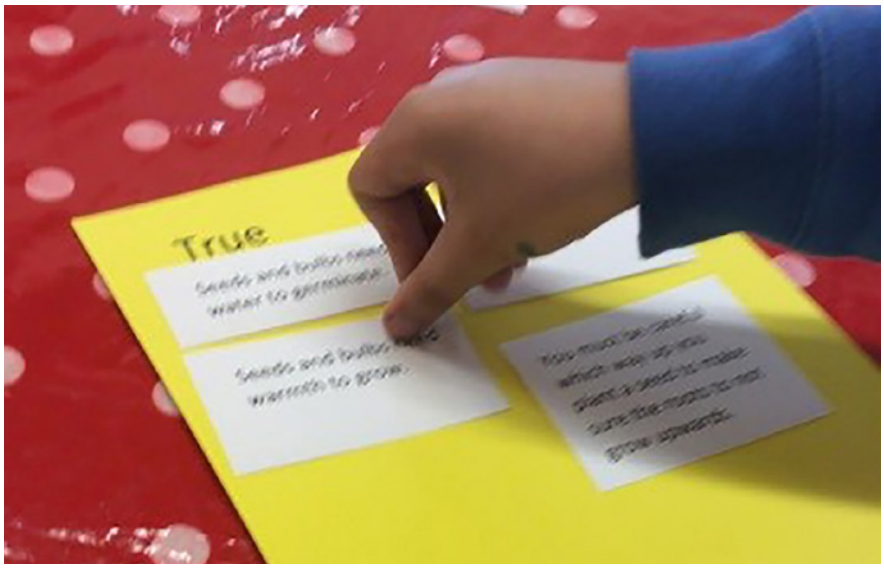
This is a great technique for teasing out misconceptions in science and promoting talk.

Give the children a set of statements on cards to sort into true and false – I have a set of photocopied boards on card for the children to sort onto. It takes a bit of time initially to make, but they then last for years. Never expect children to do this on their own: the key is the discussion while they are doing it and when you go through it. Try to include many common misconceptions to ensure lots of discussion. This is another great assessment tool, which can be used throughout a science topic (although not at the end, because time is needed to deal with any misconceptions that still exist).

TOP TIP

I would never expect this to go in books; it is a formative assessment tool and it needs to be low stakes for it to be effective.





True or false activities being used in the classroom

Cloze text

This is a very good technique when children are just beginning to learn new concepts or vocabulary, as it gives them a chance to practice without having to develop full sentences

It is particularly effective with children who are new to English, or less confident. Often cloze text is used as an individual writing activity but, in this context, it is a talk activity. Mercer *et al* (2009) state that discussion is better in threes rather than twos once children are in Year 2 (age 7), because one child is less likely to dominate and discussion is more likely.

A pulley is a simple _____ which is used for _____ things. It reduces the _____ required to raise a _____. It consists of a wheel with a _____ through which a string or rope _____. The rope has a _____ on one end and someone or something _____ at the other _____.
They have been used for _____ of years. We think they were used in 1500 BC for hoisting water.

Lifting effort end machine grove thousands heavy load runs pulling load

TOP TIP

I use this to consolidate new learning within a lesson or at the beginning of the next one.

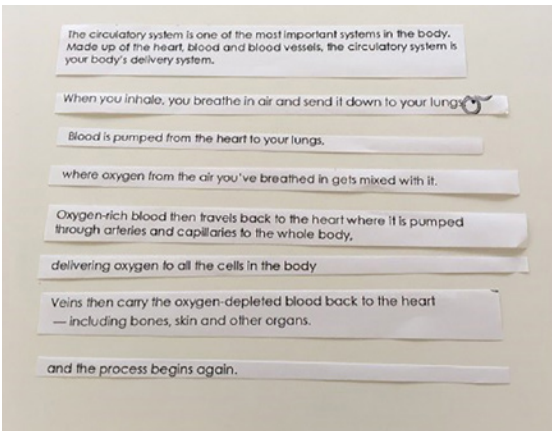
TOP TIP

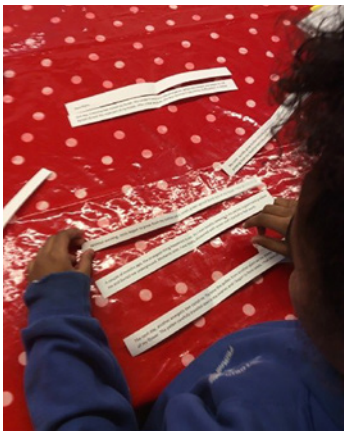
I wouldn't expect children to stick the sentences down, so I can use the same chopped up sentences again the following year – ordered sentences can be photographed if evidence is needed.

Ordering a text

This is something that we use regularly in English, so why not in science?

It works best with topics where events can be sequenced, for example, the circulatory or digestive system, or a life cycle. It is also a great technique in preparation for science writing, as you can introduce the language structures that you would want to see in a piece of writing. I always chop up the sentences in advance, as just the physical process of moving the sentences around seems to help the level of discussion within the group.





Children ordering a text – drawing upon strategies used in English to support science teaching

PSEC's lively exhibition hall - full of people exchanging ideas

Meet the expert

If a written outcome is needed, or you simply want to assess what the children have learnt, this is a great technique; it could be your final outcome, particularly if you record it.

In groups of three, the children share the roles of expert, interviewer and observer, taking it in turns to do all three. Prepare a tick sheet of key vocabulary and phrases for children to use in their explanations. The expert's role is to answer questions about the topic posed by the interviewer, whilst the observer uses the checklist to tick off what is used. They then give feedback before swapping roles and repeating the process.

Day and night

Listen to the expert explaining. When they use any of the words below, tick them off.

Important word	Number of times used				
anti-clockwise					
axis					
daytime					
Earth					
facing away from					
facing towards					
night-time					
orbits					
rotates					
spin					
Sun					
sunrise					
sunset					
time zone					

What other important words or phrases could our expert use?

Checklist for the observer

TOP TIP

Many children find it difficult to think of what questions to ask and, as a result, I often model the activity with another adult or confident child.

Vocabulary sheet to support the expert

We can record our questions and/or provide question stems for the activity, which can be used as a starting point. Props can be provided for each group if appropriate, and encourage more confident children to take the role of expert first – this gives others a chance to listen to someone else having a go. When I do this in Year 1 (age 6), I run it in pairs (interviewer and expert) and I use images as the vocabulary prompts.

Most of these strategies are familiar to primary teachers, because they use them all the time in English, but why not use them in science as well? Since the five schools in our science cluster have started regularly using them in classrooms, we have found that pupils have become more confident in their use of vocabulary and their ability to explain what they have learnt. This has supported the development of higher order thinking skills with our less confident learners and extended those who were confident. Sometimes these techniques are building blocks towards achieving a written outcome, but not always. Our objective is to develop confident, articulate young scientists.

The PSTT Science Cluster has made resources for our schools that we are happy to share, so do get in touch.

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References and further reading

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