Classroom talk and questioning in science

Why is the issue important?
Many primary teachers lack confidence about teaching science\(^1\). At the same time, research (such as Alexander, 2008\(^2\)) shows that many teachers (both primary and secondary) are unaware of how to ensure their classroom talk is constructive for learning science. This research helps on both fronts.

What did the study find out?
The researchers found that science teachers needed to question their pupils effectively to enable pupils to move from their existing everyday understanding of natural phenomena towards a scientific view. These included ‘dialogic episodes’ when teachers probed pupils’ everyday ideas with further questioning and ‘authoritative’ episodes when the teacher introduced scientific ideas. Sometimes the talk was interactive and sometimes it was not. The skill lay in making the right choices at the right time. The study also showed that while primary school teachers worked at the limit of their subject knowledge, they were more likely than secondary science teachers to focus on probing with further questions due to the wider remit they had for pupils’ learning, which included ‘speaking and listening’ as well as science.

What links between classroom talk and learning did the researchers find?
The researchers identified the links between dialogic teaching and meaningful learning by examining the ‘pathways’ followed by individual pupils in their learning. For example, one pupil progressed from everyday to scientific thinking through a number of learning steps that included:

- becoming aware of her everyday views;
- comparing everyday and scientific views;
- developing an understanding of the scientific view;
- applying the science view in different contexts; and
- reviewing learning.

The teacher enabled meaningful learning of the science concept in question by supporting these steps in learning through activities that were mediated by talk.

How was the research designed to be trustworthy?
The research was carried out in five primary schools and three secondary schools and involved six primary and six secondary teachers and their Year 5/6/7 classes. The researchers made recordings of the teachers’ talk as they interacted with whole class, small groups and individual pupils, and the talk that occurred amongst a group of pupils in each class. From

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they identified approaches and patterns of interaction. The researchers also interviewed a sample of pupils in each class immediately after lessons and several weeks later, and gathered written work to elicit their understanding of the science concepts taught. Approximately 120 hours of classroom talk and 20 hours of interviews were recorded.

What are the implications?
The research showed the importance of teachers:

- examining and reflecting on their own dialogic teaching skills including probing and further questioning, and analysing example dialogues to increase their awareness of how they use talk and how talk can be used;
- planning activities designed to make pupils’ everyday assumptions explicit (such as sets of statements to talk about that include common misconceptions);
- noting down pupils’ everyday assumptions to use in future lessons when demonstrating the scientific view; and
- monitoring, together with pupils, the development of pupils’ understanding of scientific concepts.

Could you explore how often and confidently you use these strategies with a partner?

It also showed the importance of school leaders:

- bringing primary and secondary teachers together to enable primary teachers to develop their scientific knowledge and secondary teachers to develop their use of further questioning in science classrooms; and
- encouraging science teachers to analyse example dialogues from science lessons perhaps using the key elements of dialogic teaching in science identified by the researchers as a framework.

What opportunities exist for following up these strategies?

What do the case studies illustrate?
The case studies complement and illustrate aspects of dialogic teaching in science explored by the researchers. They show how:

- a group of primary teachers changed their pattern of classroom talk quickly and easily through an innovative approach that involved using puppets;
- one teacher alternated between two kinds of talk (authoritative talk during whole-class teaching interactions and probing questioning during group work) and the messages the two kinds of talk sent to the pupils;
- a teacher’s dialogue helped pupils to move from an everyday understanding of forces to a scientific view; and
- concept cartoons (which present a picture of a recognisable situation along with different points of view) were used as a stimulus for promoting purposeful argument between small groups of pupils in science.

To read the full resource, go to:
http://www.tla.ac.uk/site/SiteAssets/RfT2/06RE062%20Effective%20classroom%20talk%20in%20science.pdf

This resource is an extract from a RFT created by CUREE for the General Teaching Council for England.
For further practitioner friendly resources, visit www.curee.co.uk