

HOW THE 'I CAN EXPLAIN!' PROJECT HELPS CHILDREN LEARN SCIENCE THROUGH TALK

A group of children use the 'I can explain!' picture cards and language prompts to explore ideas about hot and cold



Alison Eley
describes the methods used in the project to develop scientific literacy

'I can explain!' is a project that has created training materials and resources to support children with explaining their ideas in science. Using high-quality picture cards and language prompts to facilitate rational discussion, children work in small groups to explore scientific concepts. They develop skills to learn effectively through group talk, and using these they make cognitive gains in science. They learn to justify their scientific ideas with evidence and to counter the ideas of others. The challenge of having to reach a group agreement enables the children to recognise the value of critical consideration of the reasons and evidence they give for their ideas. Funded by the Primary Science Teaching Trust, the resource is now being disseminated to schools across the UK and can be used flexibly with all ages from nursery to year 6 (ages 5–11).

The role of talk in developing understanding in science has been well documented (Osborne, Erduran and Simon, 2004; Naylor and Keogh, 2000; Mercer and Littleton, 2007) and the recognition of this in the new National Curriculum for England is very positive. The curriculum outlines the need for quality and variety of language in order for children to develop their scientific vocabulary and to articulate scientific concepts clearly and precisely. Dawes (2008) highlights the importance of being able to give rational justifications for ideas and to use evidence to support claims to knowledge; both these skills rely on good scientific literacy.

The development of good group talk skills can raise children's achievement across the curriculum, improving their thinking as individuals as well as within a group (Mercer and Littleton, 2007). Children are very used

to talking to each other in different contexts and to working in groups in the classroom. It is easy to assume, therefore, that they will succeed with any classroom task requiring group work. But, in practice, teachers are often disappointed with the outcomes of such tasks, reporting for example that one child dominated, that others took a back seat or that the group could not agree and were unable to resolve disagreements successfully. In reality, genuinely effective group talk is rare in classrooms: these skills need to be explicitly taught and, more importantly, the design of the tasks that the children are given requires careful consideration (Mercer and Littleton, 2007). When group talk activities are successful, teachers find that children can resolve disagreements themselves, that they all take part and that the achievement of the group is greater than the achievement of any one individual (Box 1).

Key words: ■ Literacy and science ■ Children's ideas

Box 1 Try this with your class

A tally of talk words

Give a group of children a discussion task; for example:

Would you say a shell was alive, once alive or has never been alive?

Listen to the discussion and record over 5 to 10 minutes how many times they use the following reasoning words and phrases:

because, but, might be, could be, probably, I agree, I don't agree.

And how many times did one child ask another a question in order to clarify something or to challenge someone else's idea?

If the children have poor talk skills, they are likely to make a series of claims to knowledge, stating what they think with little or no justification and without engaging with the ideas of anyone else, other than straight disagreement. The reasoning words and phrases won't appear very often in their discussion.

However, with practice in talk skills, including giving language frameworks, this can change quite markedly and children will consider their own and others' ideas more rationally. If you implement a programme of explicit teaching of talk skills, a before and after 'talk tally' might be an interesting exercise.

picture, depicting a garden scene or a pirate ship. In all the activities, the children work as a group to generate explanations, using the pictures to provide evidence and to help them think about what they already know or understand. Throughout all tasks, the children are encouraged to use the language of rational discussion, 'I think ... because ...', initially with prompts (Box 2). They are expected to reach a group agreement and be able to justify opinions and choices made by their group. As they become more competent and confident with working in this way, they are encouraged to explore ways of challenging the ideas of other groups.



Explicit teaching of talk skills

In order for the children to make progress in science through engaging with the 'I can explain!' lessons, they need to have developed effective group talk skills. A good strategy to start this is to get the children to work together to establish some ground rules for talk in their particular group. The idea of group rules might not be new, but if they are established by the children themselves they are more likely to succeed (Dawes, 2004). Children are more likely to respect each other's ideas and give everyone's opinion consideration, while also being able to disagree without causing difficulties within the group or between individuals. The excellent book, *Talk Box* (Dawes and Sams, 2004) provides a series of activities to develop good group talk skills; some teachers prefer using the equally excellent *Thinking Together* (Dawes, Mercer and Wegerif, 2000), which offers a very similar approach, but with activities that are designed more for upper-primary aged children.

What happens in an 'I can explain!' lesson?

In a typical 'I can explain!' lesson, the children work in groups, using pictures as a stimulus for discussion (staying in the same groups of mixed ability, threes or fours, works best). For example, they might be asked to sequence or group a set of eight small pictures of things that make sounds. Or they might be asked to look for evidence for something in a bigger

A sequence of eight small pictures of things that make sounds provides a stimulus for discussion



What are the benefits of using this approach?

Evaluation of the impact of this approach has shown that children:

- improve their group talk skills, including talking clearly about themselves as group learners and describing the behaviours of someone working well in a group;
- make progress with their scientific understanding and learn to link ideas with evidence;

Children may be asked to look for evidence in a picture such as this one of a pirate ship

Box 2 Language prompts – helping children explain

- Why do you think that?
- What is your reason for that?
- How do you know?
- What is your evidence?
- Do you have any other evidence for that?
- Can you think of another reason for your idea?
- Can you think of any reasons why your idea might not be right?
- What reasons might someone else have?
- Can you explain why you do not agree with me?
- Why might that not be true?

Box 3 Changing ideas

Using the resource made it more acceptable for children to change their mind. They were encouraged to think about why they had changed their mind and in some cases identified that it was because of something another child in their group had said; for example:

Teacher: *Did anyone change their mind today?*

Luke (Y1): *Me ... I changed from volcano to Sun [choosing the hottest picture].*

Teacher: *What made you change your mind?*

Luke: *Ben did.*

Teacher: *What did Ben say that made you want to change your mind?*

Luke: *He said that you can't feel the hot from a volcano on the other side of the world and it is far away and the Sun is very far away and you can feel the Sun is hot.*

- participate actively for extended periods of time;
- have opportunities to consider not only why a 'right' idea is 'right', but also why a 'wrong' idea is 'wrong';
- take more responsibility for their own learning by thinking about what they would like to know in order to make progress;
- better understand the nature of scientific enquiry and the way scientists work.

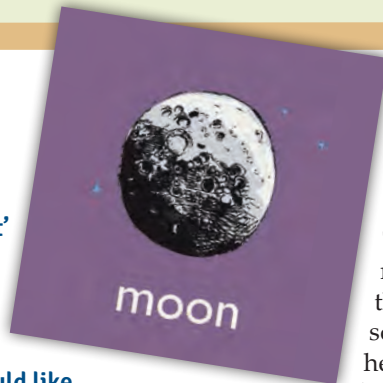
Children enjoy the activities, often reacting with delight when presented with the pictures. The activities provide a different way of learning, encouraging a community of enquiry and discussion. They are more confident to suggest an idea when they are unsure of its accuracy, as they know that the important thing is that they have linked it to appropriate evidence. As children have commented:

If you don't argue, if you talk, you can explain, and compromise.

You can learn to think and agree.

You can change your mind. (Box 3)
The approach has also shown that teachers:

- develop strategies to enable children to engage successfully with the language of science;
- find it easier to identify when and how the children have made progress in science;
- identify children's alternative conceptions more quickly and more often;



- have higher expectations of children in group tasks.

Teachers using the resource report that the talk-based science activities help children with low confidence

to participate more fully. There has also been an impact in other types of science lessons, where teachers have noticed that reticent children are more likely to engage and that children unsure of their ideas are more likely to contribute, feeling pleased to have done so even if their ideas turn out not to be correct:

The children's predictions are much more articulate and well explained. Predictions may be wrong but they make them confidently – then they are there to be tested.

Teachers have also used the 'I can explain!' activities as an assessment tool for cognitive understanding in science, reporting that they were more aware of a child's level of cognitive understanding when they were using these resources than in other types of science lesson.

Engaging with the language of reasoned argument develops a set of powerful and transferable skills that children will be able to use in their future science learning, in other curriculum areas, and in their general lives. They will be better equipped to manage their own learning by being more able

to identify what it is they need to know or be able to do in order to make progress. They will be more likely to contribute ideas without fear of being wrong, and they will be more likely to make confident challenges to the ideas of others. Using pictures as prompts for rational scientific discussion provides an accessible, unthreatening and inclusive context: giving teachers a refreshing and rewarding way to teach science.

Useful resources

Dawes, L., Mercer, N. and Wegerif, R. (2000) *Thinking Together: A programme of activities for developing speaking, listening and thinking skills for children aged 8–11*. Birmingham: Imaginative Minds.

Dawes, L. and Sams, C. (2004) *Talk Box: Speaking and listening activities for learning at key stage 1*. Fulton: London: Fulton.

'I can explain!' resource box – available from the Primary Science Teaching Trust: www.pstt.org.uk

Weblinks

Talking Science: www.pstt.org.uk/resources/continuing-professional-development/talking-science.aspx

'I can explain!': www.pstt.org.uk/project-information/projects/i-can-explain.aspx

References

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- Mercer, N. and Littleton, K. (2007) *Dialogue and the development of children's thinking: a sociocultural approach*. London: Routledge.
- Naylor, S. and Keogh B. (2000) *Concept cartoons in science education*. Sandbach: Millgate House Education.
- Osborne, J., Erduran, S. and Simon, S. (2004) Enhancing the quality of argumentation in school science. *Journal of Research in Science Teaching*, 41(10), 994–1020.

For further details of the resource and accompanying training, contact Karen Copeland: karen.copeland@pstt.org.uk

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