WONDER WILD!

Bringing philosophy into the science classroom

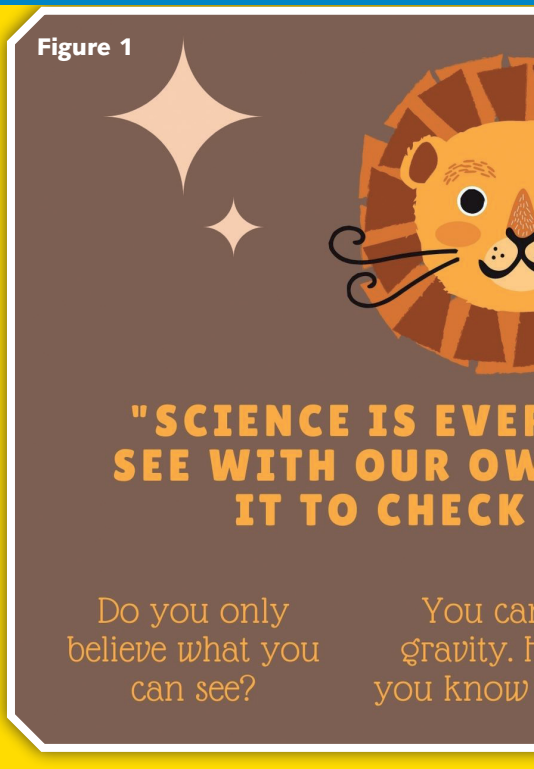

Figure 1

Nicole Green Vella and **Lynda Dunlop**
discuss how philosophy and science can be taught together in the primary classroom

Plumbing and philosophy are both activities that arise because elaborate cultures like ours have, beneath their surface, a fairly complex system which is usually unnoticed, but which sometimes goes wrong. In both cases, this can have serious consequences. Each system supplies vital needs to those who live above it.
(Mary Midgley, 1992)

Philosophy is concerned with fundamental questions about knowledge, truth, reality, experience, justice and what is right and wrong. These questions underpin all human knowledge and activity (including science) but, as Midgley argues, while few people dismiss the need for plumbing, there are plenty who dismiss the need for philosophy. Philosophy is often absent from primary education and perceived as antagonistic to science, even by high-profile scientists past and present. So why do we propose that philosophy be brought into primary science classrooms?

Rationale for teaching philosophy

In an information – and misinformation – rich world, there is a need to prepare children to look for the evidence behind knowledge claims, to find out how knowledge is created and understand how scientists and others justify their claims. There is also a need to analyse the social, ethical and political questions about how science is done and how scientific knowledge should be used. Philosophy has the tools for encouraging children to engage with these questions, which are often squeezed out of content-heavy curricula. Doing philosophy involves asking questions, analysing concepts, identifying assumptions and thinking clearly and critically about ideas. Through its methods – questions, thought experiments, analysis and logic – it offers tools for inquiry. These practices are also important in science but, in contrast to science, answers to philosophical questions are not typically found using empirical methods: they are found by reasoning.

Some approaches

In recent years, visual approaches to doing philosophy with children have emerged across Europe. The *Wonder Ponder* resources (Duthie, 2020), for example, invite children to respond to philosophical questions prompted by consideration of illustrated scenes relating to personhood, freedom, cruelty and dying. The *PhiloZoo* project encourages children to inquire, reflect and develop conceptual understanding in response to questions such as *'Is an apple alive?'* and *'Is silence also sound?'* from 'Philo Frog' and the 'Doubting Sheep', among other characters (de Schrijver and Cornelissen, 2016) – cards available to purchase in English on request. These

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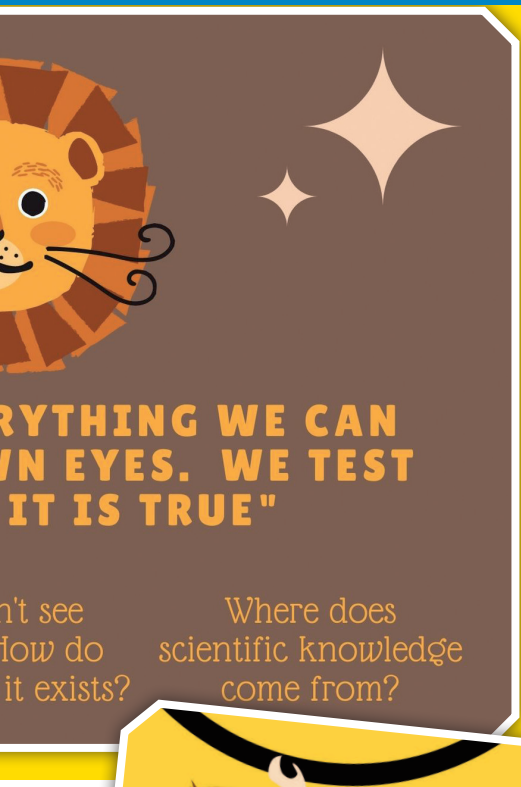


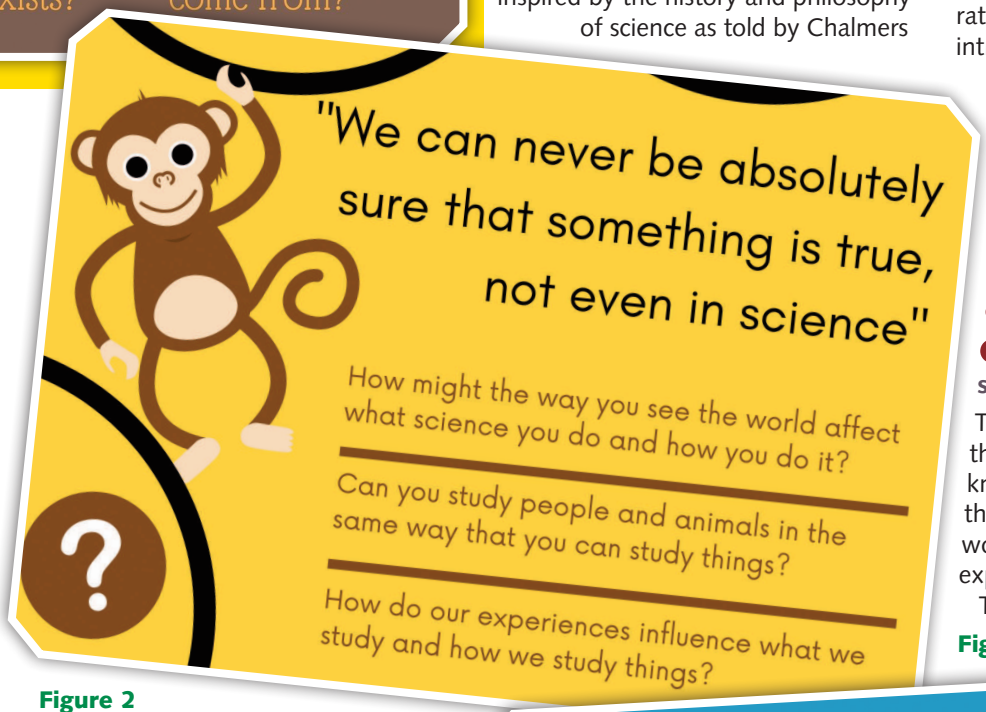


Figure 2

visual stimuli for doing philosophy with children are engaging ways into thinking about the big questions that continue to occupy philosophers.

The *Wonder Wild* project

Our *Wonder Wild* research project uses visual stimuli (animal cards) to find out what children and teachers think about science. *Wonder Wild* consists of a series of cards, each inspired by a big idea from philosophy of science and introduced by an animal. It introduces children to ideas from the philosophy of science, putting the ideas into animal quotes and suggesting discussion questions to explore the ideas. The justification for using animals on the cards is to neutralise any misleading associations centred on what a scientist or 'a person doing science' would look like. In *Wonder Wild*, the aim is to encourage children and teachers to think philosophically about how science works in order to understand how they make sense of the subject and their world. Because there is more than one good answer to a philosophical question, children and teachers can explore and evaluate different perspectives. In responding to the cards, children (and teachers) reveal how they understand science and society. This can provide a window into their future learning needs, the sorts of examples that they might find relevant, and priorities in the public understanding of science.

The *Wonder Wild* resources

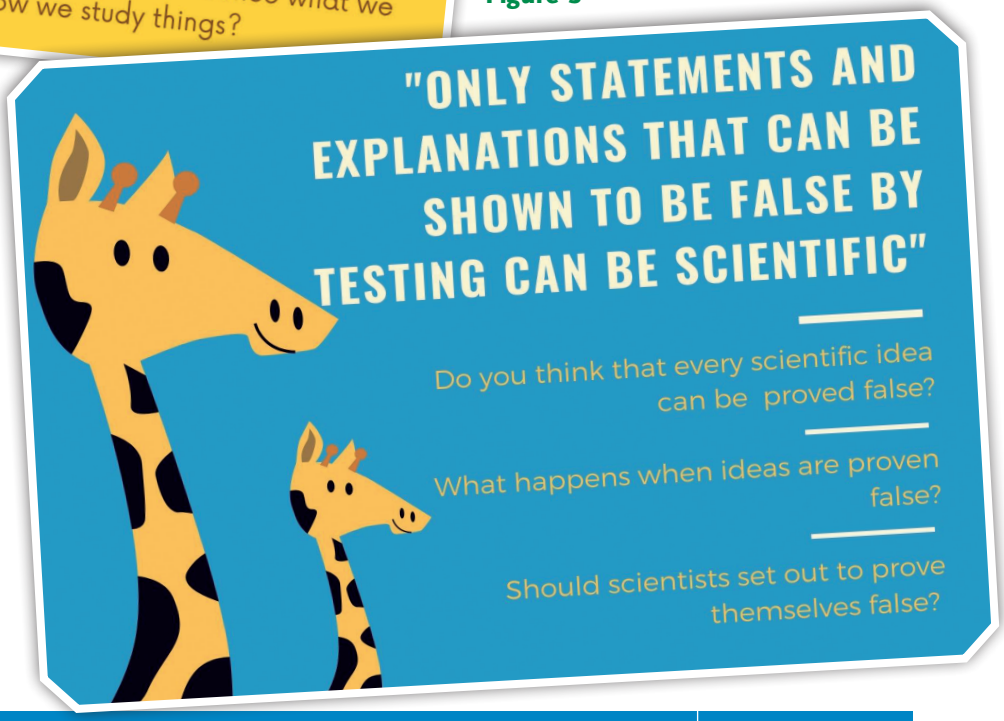
Big ideas included on the cards are inspired by the history and philosophy of science as told by Chalmers (2013) and others. These range from Francis Bacon's early work on induction to Nancy Cartwright's recent work on scientific practice, causation and inference. Ideas featured include induction (where scientific evidence is accumulated and used to make generalisations), the demarcation problem (how to distinguish science from non-science) and falsifiability (the idea that science cannot be used to support ideas, but rather to rule them out). The ideas are introduced using a quote or situation, and children are invited to answer big questions that have challenged philosophers of science such as:

- **What is the difference between science and other ways of knowing?**
- **Do scientists discover or create knowledge?**
- **What makes a method 'scientific'?**
- **Can we ever be certain that scientific knowledge is true?**

These questions are not asked in the spirit of testing what children know, but to find out about what they understand about how science works and to facilitate collaborative exploration of these ideas.

The lion card in Figure 1, for

Figure 3



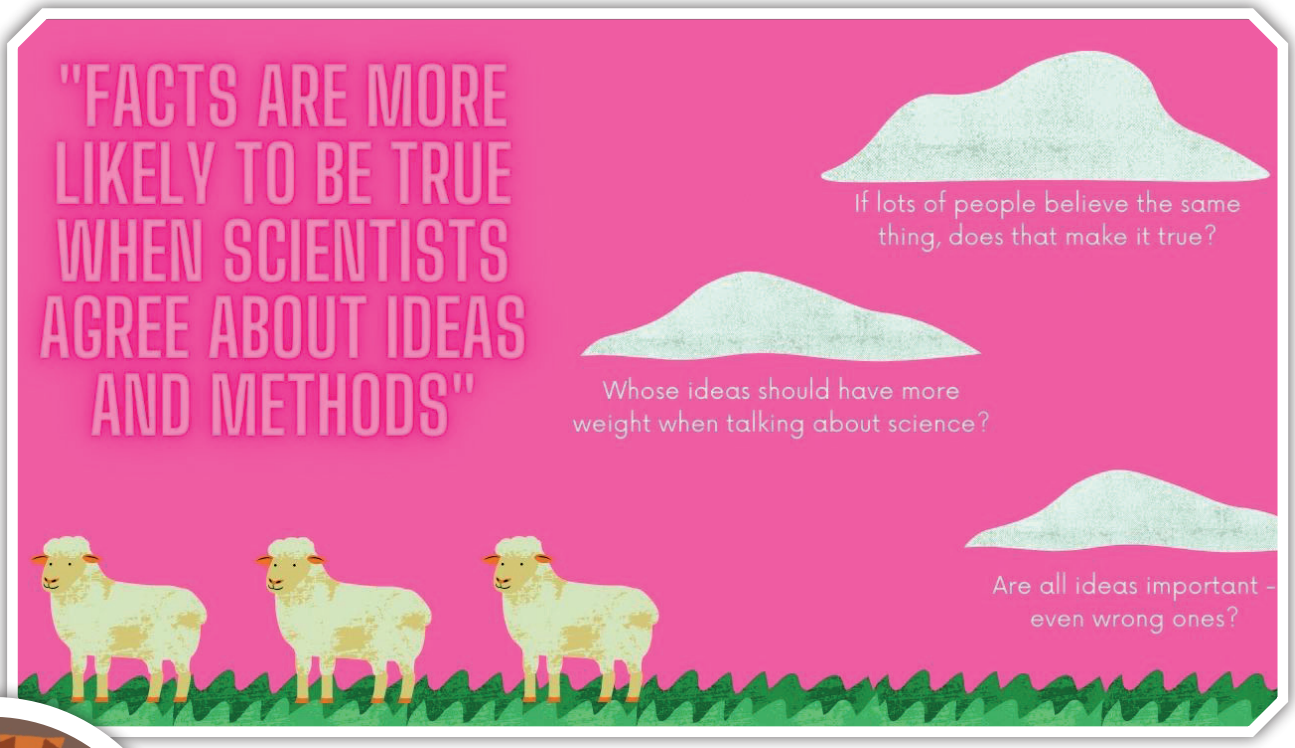


Figure 4

example, encourages the children to think about whether observation alone is enough to provide evidence for scientific knowledge. Thus, it challenges children to think about the importance and limitations of observation, and whether 'there is more to seeing than meets the eyes'. The monkey card (Figure 2) stimulates thinking about science, objectivity and certainty. The giraffe card (Figure 3) allows children to explore the logic of falsifiability, while the sheep card (Figure 4) encourages children to consider truth, reality and different perspectives in science. These address demarcation criteria, scientific methods, knowledge construction, interpretation, criticality and certainty, among other ideas from the philosophy of science.

When children have discussed the ideas presented by the different animals, they can identify those they agree and disagree with. Through reflection and elaboration of their ideas, the cards can help children to make sense of their understanding of science, where it comes from, its subjects, and its methods for generating and justifying knowledge claims.

Feedback

The cards are currently being used as a research tool for investigating what primary-age children and their teachers understand about how science works. Feedback from teachers suggests that the cards are useful for teaching as well as research. Teachers have observed that the cards help them to distinguish between real-life science and school science, and that the philosophical dialogue with others helped them to expand their understanding of what science is and to think about how this is communicated in class, both explicitly and implicitly. As one teacher commented:

I didn't think there were so many different approaches either. Before I believed that there was only one way and that's it but this made me think more deeply about science and made me realise that we all have very different views of science, which I think we have to take into consideration in class as well. Perhaps I consciously become aware of how we teach science and what sort of view we are, you know, putting across.

Opening up discussion about how science works or the 'nature of science' also enables educators to understand where children stand in terms of their understanding of science and nature of science. The cards are a useful resource for examining the 'philosophical plumbing' that is taken for granted when science is done and taught.

Pilot work with teachers indicates that *Wonder Wild* is an appropriate resource for bringing philosophical dialogue into science classrooms because the cards encourage critical thinking about science and how it works – topics that are rarely discussed in primary science. Teachers have told us they like that the cards are simple, clear, and relatable, which allows children to read as much or as little into them as they want. They allow children to bring their own knowledge and examples into discussion, to engage with ideas from the philosophy of science – and it is easier to disagree with an animal than a person!

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