# Defining Excellence in Primary Science

## The Primary Science Teaching Trust's vision is to see excellent teaching of science in every primary classroom in the UK

This document provides a working definition of what we believe constitutes excellence in primary science teaching. Based on this definition, we have outlined the characteristics of an excellent science lesson and what we would therefore expect to see in an observation of a teacher shortlisted for a Primary Science Teacher Award.

The Primary Science Teaching Trust
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Primary Science Teaching Trust

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Excellence in primary science education is characterised by dynamic and engaging learning environments where all children see themselves as scientists. The teacher uses creative and interactive teaching approaches, fostering a sense of wonder and curiosity, and encouraging children to explore, question, investigate and explain the natural world. The children are aware of the relevance of their learning in science to their own lives and to the real world.

Excellent science lessons are based on a curriculum that is relevant to the local context and culture, and that supports the wider aims of primary education. Teachers have secure subject knowledge and pedagogical understanding. Teachers value children's existing ideas and experiences and draw on their prior learning to strengthen and develop their scientific understanding. Teachers make effective use of formative assessment strategies to identify children's misconceptions and emergent understandings, and they adapt their teaching to address these in an age-appropriate way, encouraging the children to consider new evidence or alternative ideas or explanations. Teachers provide concrete, first-hand learning experiences that prepare children for developing their understanding of the increasingly abstract or complex scientific concepts they will encounter in later phases of learning. Teachers make use of appropriate technology to support children's learning in science.

Excellent science lessons develop children's critical thinking and problem-solving skills. They provide opportunities for children to learn and apply skills of scientific enquiry and to develop their understanding about the ways in which scientists work. Children ask questions and are eager to explore phenomena; they have agency and are purposeful in their science learning. They explain their ideas and justify them with evidence, make confident challenges to the ideas of others, and are comfortable to change their minds in response to new evidence. Children use scientific vocabulary with understanding, make connections between new and previous learning in science and across other curriculum subjects, and communicate their learning in a variety of ways.

Excellent science lessons support children to be resilient and collaborative learners. Children become scientifically literate and develop confidence to consider the ethical implications of science. They are equipped to make responsible, informed decisions about their own lives and about society, and to make positive contributions to the global challenges faced, including biodiversity loss, climate change and sustainability.

# Characteristics of an excellent science lesson

## Always

### The teacher:

- demonstrates secure science subject and pedagogical knowledge;
- has planned appropriately challenging learning experiences that build on the children's prior knowledge, understanding and personal experiences;
- actively promotes diversity and inclusion in science, ensuring that all children view science as for them and that stereotypes about scientists are challenged;
- is flexible and adapts the lesson according to how the children respond, including identifying children's misconceptions and emergent understandings and addressing these effectively.

### The children:

- are actively participating: asking questions, thinking critically and explaining and justifying their ideas;
- can communicate their scientific knowledge and understanding and its relevance to their own lives and the wider world;
- work safely and are aware of the importance of this.

## Desirable

### The teacher:

- models how scientists work, e.g. changing their minds in the light of new evidence, questioning what they observe, making objective measurements, thinking about different explanations;
- provides scope for independent exploration;
- encourages children to be creative in their learning;
- makes effective use of the outdoors learning environment;
- uses appropriate technology to enhance the learning experience in science.

### The children:

- are learning and/or applying the skills of scientific enquiry*;
- reflect and summarise their learning, e.g. verbally, writing, drawing, modelling, drama;
- collaborate to solve problems and find answers to questions;

## Excellent science lessons are supported by:

- strong science subject leadership and whole school leadership;
- teachers participating in regular professional development for science and keeping up to date with new initiatives and the latest evidence about 'what works';
- a school ethos where science is clearly valued, and which is shared with parents and across the wider school community.

*Important note: *Science enquiry is a core part of science learning and children should be taught these skills and have opportunities to apply them in investigations in relevant contexts. It is expected that science lessons will almost always include opportunities for this, but because a science lesson can still be deemed excellent without necessarily including a practical enquiry element, this statement appears under 'desirable' rather than 'always'.*

# Evidence Base

## These definitions and descriptions have drawn on evidence from:


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