



The Learning Institute

Supporting primary science

Part 2: Scientific knowledge and understanding, the use of scientific vocabulary and addressing

Overview

Science, together with English and mathematics, is a core subject within the national curriculum therefore science should have a prominent place within the timetable. This CPD task seeks to support practitioners by helping them to understand the structure of primary science curriculum and learn ways to support pupils in practical science activities. There are three separate stand-alone parts to this CPD.

This second part helps to give you an understanding of the scientific knowledge and conceptual understanding element of the science curriculum. It will help you realise how important it is to use correct scientific vocabulary and recognise and address some of the misconceptions that children may have acquired.

Target audience

Teaching assistants, and others who work in primary science

Duration

Approximately 1 hour

The Learning Institute provides opportunities for individuals and communities through high quality education, training and research programmes that challenge personal barriers and promote social inclusion. To find out more, please get in touch.

Introduction

Can you remember your science lessons at secondary school? It is likely that you were taught biology, physics and chemistry, either discretely or as a combined subject.

Is science taught as a discrete subject in your setting or does it form part of a cross-curricular approach? There are many ways that science is taught at primary level. This CPD is designed to develop your understanding of how to support your pupils no matter which way the subject is approached in your setting or what your own knowledge of science is.

This second session familiarises you with the scientific knowledge that is taught and helps you understand how it builds on previous learning. You will gain an understanding of why the use of correct scientific vocabulary is important and you will be helped to identify some of the common misconceptions held by children and be given strategies of how to deal with them.

Objectives

- To understand what scientific knowledge and conceptual understanding is taught in Key Stage 1 (KS1) and Key Stage 2 (KS2)
- To explore some elements of the curriculum and track progression through a key stage
- To understand the importance of scientific vocabulary
- To consider how children's misconceptions may arise and why it is important to address them

Resources

Pen and paper for note taking

Internet access to following:

- Science programmes of study: key stages 1 and 2 [document], available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/425618/PRIMARY_national_curriculum_-_Science.pdf
- Misconceptions and conceptual change in science education [webpage], available at <https://thescienceteacher.co.uk/misconceptions-in-science-education/>

Task 1: The knowledge and concepts found in the science curriculum

This task is to help you to understand how the science curriculum is structured. It will help you become aware of how the programmes of study build on one another as children progress through the key stages.

Look through the programmes of study for each year group found in the science national curriculum, available at

- Go through the programmes of study and note down which topics can be considered to be biology – for example, Y1 “Plants” and “Animals including humans” would fall into this category. Read the statutory requirements.
- Repeat for physics and chemistry

Can you see how some of the topics build directly on previous ones? For this reason, it is essential that children have secure understanding of an area to enable them to subsequently build on this knowledge. Insecure understanding may well lead to the establishment of misconceptions which can hamper future progress.

Task 2: Scientific vocabulary

You may have noticed that specific terms and vocabulary are used throughout the programmes of study. It is important that children understand what these words mean and are able to use them in context. They should also be able to read and spell them. To support children in this, it is important that you are confident in your own understanding of the terms.

Understandably, and depending on your experience, you may not be sure as to the precise meaning of some of the terms children are expected to know. Below is a list of six words taken from the programmes of study for each of the year groups:

- herbivore
- materials (NOT fabric)
- pollination
- condensation
- insulator
- dissolve

Can you explain what each of these terms means? If you cannot, look them up before the children ask you!

Task 3: Misconceptions

Children start school with their own ideas about the world around them. These are constructed through their everyday experiences. While some of these ideas may be sound, others may be absolutely wrong (misconceptions). Through effective teaching, these early ideas are either built upon or can be transformed into correct understanding.

You have already looked at how concepts in the science curriculum build on previously learned ones. It is important that supporting adults identify misconceptions as soon as possible. Once firmly established, they can be difficult to change and can impede future learning.

Here are a few examples of commonly held misconceptions:

- Young children often think that trees are not living because they do not move or feed in the same way as an animal.
- Trees and plants get their food from the soil. *They produce the energy they need to live in their leaves by using water from the soil and carbon dioxide from the air.*
- Sugar melts in tea. *It dissolves in tea when it is absorbed into the liquid. Melting occurs when a solid changes to a liquid through heating.*
- Electricity is a fuel. *It is a form of energy. A fuel produces heat or power usually by burning.*
- Soil is a dead substance. *Although soil cannot be classified as living, it contains millions of small and microscopic organisms.*
- Shadows form when light is reflected by an object. *Shadows form when light is blocked by an object.*
- The earth is nearer to the sun in the summer. *The earth's axis is tilted towards the sun and this gives the northern hemisphere hotter temperatures and longer days.*

Read up to and including *Other sources of misconceptions* on The Science Teacher website, available at <https://thescienceteacher.co.uk/misconceptions-in-science-education/>.

Sometimes children do not change their ideas easily. According to Rosalind Driver, cited on this website, what strategies can be used to support children in doing this?

Suggested strategies for dealing with misconceptions:

- Never laugh at a child or simply say, "That is wrong".
- When possible, use questioning or a practical activity to lead the child to the correct concept.
- Try to finish by asking the child to explain why their original misconception is not correct.

Task 4: Reflection on learning

Note down your responses to the following questions:

- What knowledge did I already have that has been refreshed by this CPD?
- How has this CPD developed my knowledge and understanding?
- How can I apply what I now know to my practice

Sources

Department for Education (2013) *Science programmes of study: key stages 1 and 2*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/425618/PRIMARY_national_curriculum_-_Science.pdf (Accessed: 19 June 2020)

The Science Teacher (no date) *Misconceptions and conceptual change in science education*. Available at: <https://thescienceteacher.co.uk/misconceptions-in-science-education/> (Accessed: 19 June 2020)

Further reading

Pine, K., Messer, D. and St. John, K. (2001) *Children's Misconceptions in Primary Science: A Survey of teachers' views*. Available at: <https://www.tandfonline.com/doi/pdf/10.1080/02635140120046240> (Accessed 19 June 2020)

Want to learn more?

If you enjoyed this CPD, you may be interested in our other courses. Find out more on our website:

FdA Learning and Education - www.learninginstitute.co.uk/fdle

Other foundation degrees - www.learninginstitute.co.uk/our-courses

Apprenticeships - www.learninginstitute.co.uk/apprentices