Science Curriculum Rationale and Purpose

Introduction

At Coton-in-the-Elms Primary School, we aim for every child to have PEACE and the decisions we take are driven by 5 simple words, which we hold dear.
Perseverance. Enjoyment. Awe & Wonder. Compassion. Excellence.

- We Persevere to offer our very best and work closely with every family
- We foster a sense of Enjoyment for all who is involved with our school
- We provide plenty of Awe & Wonder moments to make school memorable and learning exciting
- We encourage and promote acts of kindness and Compassion
- We strive to deliver Excellence in all that we do by making continual improvements and never 'standing still' for the good of all children

We believe that through the accumulation and application of knowledge, children are equipped to experience 'life in all its fullness' (John 10:10).

'If any of you lacks wisdom, let him ask God, who gives generously to all without reproach, and it will be given him.' James 1:5.

Thanks to God's creation, we have a diverse environment for people to live in and explore. The natural geography of Earth provides amazing resources to support life across the globe and continues to influence people's choices and impact their daily lives. As people spread their influence, the landscape changes and evolves. We ensure our geography curriculum teaches children locational knowledge; physical geography and how humans impact on their environment; in order to understand their place within the world.

Curriculum Purpose: Why study Geography?

Why do learners at Coton-in-the-Elms Primary need to study Science?

Science is a means of discovering and understanding the world around us. It consists of a body of knowledge which attempts to explain phenomena and experiences. It also involves a number of skills and processes by which this knowledge is achieved and applied. Science is also concerned with the development of attitudes concerning scientific activity. Science forms an integral part of our everyday life. It is therefore important for all children to be scientifically literate.

"Children are naturally curious. Science at primary school should nurture this curiosity and allow them to ask questions and develop the skills they need to answer those questions."

Louise Stubberfield

What are the aims for the Science curriculum?

(i.e. what do we want learners to be able to know and do by the time they leave school?

As our children leave Coton-in-the-Elms Primary School, they need the right knowledge and investigative skills for their secondary education. It is important that they are able to see the relevance of science in their own lives, and imagine future science related careers based upon it. Recent research by UCL has highlighted that: "Children's 'science identities' – the extent to which they see science as 'for them' – are formed early and affect their future interests and aspirations. We want them to cultivate a curiosity about the natural world; empathy for the people who live in it and understand how humans can impact upon Earth. We want our children to be able to at the very least meet the requirements of the national curriculum:

The national curriculum for science aims to ensure that all pupils:

- develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics
- develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them
- are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future

Our Curriculum

How is our curriculum designed?

We ensure that our subject knowledge is up to date. We engage in a range of professional development through the local authority, from the DfE and read and reflect on OFSTED's research materials - https://www.gov.uk/government/publications/research-review-series-science/research-review-series-science

At Coton-in-the-Elms CE Primary School we aim to deliver a high quality of Science education which engages and inspires pupils to develop a love and enjoyment of Science. We aim to give children opportunities where they can increase their self-confidence, creativity and sense of achievement. The opportunities we provide as a school will build resilience and perseverance, allow children to show compassion to others and encourage children to reach for excellence. We aim to not just give children the basic curriculum but provide them with enriching, real life experiences which promote a sense of awe and wonder and allow them to express talents and skills which may inspire them for later life.

At Coton-in-the-Elms, Science is not only about becoming a Scientist but developing life skills that will allow children to reach their full potential in society.

The aims of science are to enable children to:

- Ask and answer scientific questions;
- Plan and carry out scientific investigations, using equipment, including computers, correctly;
- Know and understand the life processes of living things;
- Know and understand the physical processes of materials, electricity, light, sound and natural forces;
- Know about the nature of the solar system, including the earth;
- Evaluate evidence and present their conclusions clearly and accurately.

There is a spiral progression of scientific knowledge where children can revisit and build on previous learning. Our lessons are sequenced to ensure progression of skills and knowledge. Staff have received training about the Science of Learning. Based on this educational research, each lesson begins with a 'Can you still…?' activity, drawing on prior learning from the previous lesson, previous unit of work and form previous units. This is to ensure that the knowledge gained over time is revisited and embedded into their memory. The problems that novices face in scientific understanding arise in part from a lack of organised knowledge, ultimately undeveloped schema. Opportunities to revisit prior learning and to have new and repeated encounters with contexts will build a breadth and depth of knowledge.

Where there are gaps in knowledge, teachers adapt the lessons to address these. These adjustments are noted and any content not completed due to time restrictions or having to revise previous content, is noted on the long-term plan and picked up later. This might be through merging lessons or could be to have additional lessons to meet lesson objectives.

Which values underpin the curriculum content?

Our values of P.E.A.C.E are all evident in the science curriculum. Within the science curriculum, children will be provided with the opportunity to develop their enquiry skills, through exploring wonders of the natural world; perseverance through trying other investigations; empathy and compassion through learning about the and the impact of humans on the world's environment. A focus on practical activities to illustrate scientific processes or investigative skills aims to inspire and create enjoyment in the subject for children where a culture of excellence is promoted throughout their learning.

How are British Values taught from science?

In Science we learn to confidently share our own opinions and ideas and respect the opinions of others. Within our lessons pupils are encouraged to make their own choices when planning an investigation and recognise that others may have different points of view.

Inclusion: Our curriculum is ambitious for all and is adapted through differentiation, scaffolds and support to address inclusion and disadvantage in its implementation.

Which links to careers can be made within the Science curriculum?

Electrical engineer, medical physicist, forensic scientist, research scientist, architect, ecologist, ecologist, meteorologist, environmental scientist, geologist, biochemist, laboratory technician, microbiologist, doctor, science teacher.

Science Rationale: Why study Science in this way?

Why has the specific knowledge been selected?

Our science curriculum focuses on content required by the National Curriculum; and scientific content that will inspire and engage children. Working Scientifically is taught through, and clearly related to, the programme of study. Pupils at Coton-in-the-Elms CE Primary learn to use a variety of approaches to answer relevant scientific questions by collecting, analysing and presenting their findings.

Why is it taught in the order that it is?

The knowledge and understanding of science spirals incrementally as the child progresses through our school. The expectation of investigative skills, recording, questioning and independence becomes more complex through KS1 and KS2. The threads which run vertically through our curriculum include animals and humans, materials, light, electricity, plants, living things and their habitats and forces.

How are Science lessons delivered?

Science is taught in weekly sessions therefore, six units of geography will be taught across the year but there will be ongoing links to other curriculum areas where appropriate. Each unit will cover a specific area of scientific knowledge, alongside a Working Scientifically skill and/or investigative process. Teacher's may choose to block these lessons if they feel this is more beneficial to children.

What is the impact?

Children will be equipped with scientific knowledge and investigative skills for their future. They are able to see the relevance of science in their own lives, and imagine future science related careers based upon it. They have a curiosity about the natural world; empathy for the people who live in it and understand how humans can impact upon Earth. Science encourages the power of rational explanation by promoting logic, honesty and creativity, formulation of questions, interpretation of evidence and coordination of these with theories. Modern Society needs citizens who are skilled rational problem solvers in their daily lives. The ability to research, report, collaborate and communicate, whilst demonstrating ethical principles and negotiation skills, is beneficial for any career. Enquiry based science, through communication, has been shown to improve reading and writing abilities. Along with the general skills gained in literacy, numeracy and ICT, there are also cross curricular links with health and sex education, citizenship and sustainable futures.

Science Curriculum Aims (end-points/expectations)

What do pupils learn?

OFSTED's research series in 2021 into Science states that high quality science education should ensure:

- Pupils learn a body of knowledge relating to the products and practices of science, such as atoms and cells,
- Pupils are able to explain the material world and 'develop a sense of excitement and curiosity about natural phenomena'.
- Pupils learn how scientific knowledge becomes established through scientific enquiry.
- Pupils appreciate the nature and status of scientific knowledge: for example, knowing it is open to revision in the light of new evidence.
- Pupils learn about its uses and significance to society and their own lives. This will highlight the significant contribution science has made in the past. For example, by eradicating smallpox and discovering penicillin.
- Pupils will also learn about the continuing importance of science in solving global challenges such as climate change, food availability, controlling disease and access to water.

- Science education also provides the foundation for a range of diverse and valuable careers that are crucial for economic, environmental and social development.

What are the aims, end-points, of specific stages of the curriculum?

EYFS

Early Learning Goal:

Understanding the World - People, Culture and Communities

Children at the expected level of development will:

- know about similarities and differences in relation to objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur, and talk about changes.
- understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.

Physical Development - Health and self-care

Children know the importance for good health of physical exercise, and a healthy diet, and talk about ways to keep healthy and safe. They manage their own basic hygiene and personal needs successfully, including dressing and going to the toilet independently.

Key Stage 1

The principal focus of science teaching in key stage 1 is to enable pupils to experience and observe phenomena, looking more closely at the natural and humanly-constructed world around them. They should be encouraged to be curious and ask questions about what they notice. They should be helped to develop their understanding of scientific ideas by using different types of scientific enquiry to answer their own questions, including observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests, and finding things out using secondary sources of information. They should begin to use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways. Most of the learning about science should be done through the use of first-hand practical experiences, but there should also be some use of appropriate secondary sources, such as books, photographs

and videos. 'Working scientifically' is described separately in the programme of study, but must always be taught through and clearly related to the teaching of substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content. Pupils should read and spell scientific vocabulary at a level consistent with their increasing word reading and spelling knowledge at key stage 1.

Lower Key Stage 2

The principal focus of science teaching in lower key stage 2 is to enable pupils to broaden their scientific view of the world around them. They should do this through exploring, talking about, testing and developing ideas about everyday phenomena and the relationships between living things and familiar environments, and by beginning to develop their ideas about functions, relationships and interactions. They should ask their own questions about what they observe and make some decisions about which types of scientific enquiry are likely to be the best ways of answering them, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative and fair tests and finding things out using secondary sources of information. They should draw simple conclusions and use some scientific language, first, to talk about and, later, to write about what they have found out. 'Working scientifically' is described separately at the beginning of the programme of study, but must always be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content. Pupils should read and spell scientific vocabulary correctly and with confidence, using their growing word reading and spelling knowledge.

Upper Key Stage 2

The principal focus of science teaching in upper key stage 2 is to enable pupils to develop a deeper understanding of a wide range of scientific ideas. They should do this through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically. At upper key stage 2, they should encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. They should also begin to recognise that scientific ideas change and develop over time. They should select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information. Pupils should draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings. 'Working and thinking scientifically' is described separately at the beginning of the programme of study, but must always be taught through and

clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content. Pupils should read, spell and pronounce scientific vocabulary correctly.

Safeguarding

We take the safeguarding of our pupils and families extremely seriously. As the science curriculum uses a variety of online sources for research e-safety runs through the curriculum. We provide parents with e-safety ideas and reflections through the school newsletters. Curriculum workshops all include an aspect of e-safety to support parents' awareness and support them in ensuring pupils are safe at home when online.

Useful science links include:
https://kids.nationalgeographic.com/#
https://earth.google.co.uk/
https://classroom.thenational.academy/subjects-by-key-stage
https://www.billnye.com/
https://www.brainpop.com/
https://www.exploratorium.edu/
https://www.nasa.gov/kidsclub/index.html
https://www.pbs.org/wgbh/nova/labs/