



Science Vision:

At Padbury CE School our vision is for every child to shine in all they do where they can foster a love of learning. Science in its practical nature is a great vehicle for developing their skills, enabling them to shine as they explore and discover the world around them. In our ever-changing world, pupils need to have the knowledge, skills and attitudes to learning that that will enable to succeed. Through our practical and enjoyable curriculum, we aim to inspire and excite our children and foster a thirst for this knowledge. We believe that these opportunities will ensure that our children are confident, life-long learners who will explore science around them with positivity.

Science teaching is good at Padbury CE School when...

- there is a good balance of knowledge and scientific enquiry
- lessons are informative and thought provoking
- children are able to use a range of methods to explore investigations
- children are leading the learning experience with the teacher as the facilitator
- lessons are differentiated to meet the needs of all children
- lessons are well resourced
- children are able to question and respond to topics with discussion and scientific language
- recorded learning is meaningful and extends learning

Aims and Purposes of Science:

“A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world’s future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.” National Curriculum 2014

Aims

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.

Curriculum Intent for Science across Foundation Stage, Key Stage 1 and Key Stage 2

Intent

At Padbury CE School, we recognise the importance of Science in every aspect of daily life. As one of the core subjects taught in Primary Schools, we give the teaching and learning of Science the prominence it requires.

The Scientific area of learning is concerned with increasing pupils' knowledge and understanding of our world, and with developing skills associated with Science as a process of enquiry. It will develop the natural curiosity of the child, encourage respect for living organisms and the physical environment and provide opportunities for critical evaluation of evidence.

In EYFS the Science curriculum gives children an opportunity to develop a strong understanding of the world around them and develops their natural curiosity to find out how and why things happen in the way they do. As Scientists, children experience science through different contexts that are engaging, contextual and appropriate for their age group. They acquire specific skills, vocabulary and knowledge to help them to think scientifically using enquiry and investigation and encouraging creative thought. Children learn to ask scientific questions and discuss issues which affect their lives, their community and the world as a whole, now and in the future. Through a variety of first hand experiences, children have the opportunity to develop their understanding of the world through exploration and investigation.

As the children progress through the school, in conjunction with the aims of the National Curriculum, our Science teaching offers further opportunities for children to:

- 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;
- Be equipped with the scientific knowledge required to understand the uses and implications of Science, today and for the future.
- Develop the essential scientific enquiry skills to deepen their scientific knowledge.
- Use a range of methods to communicate their scientific information and present it in a systematic, scientific manner, including I.C.T., diagrams, graphs and charts.
- Develop a respect for the materials and equipment they handle with regard to their own, and other children's safety.
- Develop an enthusiasm and enjoyment of scientific learning and discovery.

The National Curriculum will provide a structure and skill development for the science curriculum being taught throughout the school, which is now linked, where possible to the theme topics to provide a creative scheme of work, which reflects a balanced programme of study.

Children have weekly lessons in Science throughout Key Stage 1 and 2, using various programmes of study and resources. In Early years, science is taught through the children learning about the world around them in their learning through play. Additional opportunities are provided in Science, such as



Science Fairs for children in the local Grammar School and educational visits linked to the science curriculum, such as visits to the Natural History Museum and Forest Schools.

We endeavour to ensure that the Science curriculum we provide will give children the confidence and motivation to continue to further develop their skills into the next stage of their education and life experiences.

We believe that levels of science capital (cultural capital and social capital) can be increased by:

Engaging parents

- Involving parents in children’s science education. This could be via collaborative homework or initiatives that work with parents directly such as Science for Families.
- Letting parents know it’s OK not to know the answers to everything children ask about science, and promoting “I don’t know, let’s see if we can find out”.

Revealing the relevance of science

- Exploring how a particular area of the STEM curriculum is relevant to real life.
- Highlighting the different careers that are related to topics taught in school.

Challenging popular stereotypes

- Presenting STEM as ‘normal,’ not ‘hard’.
- Challenging gendered attitudes around appropriate career choices for boys and girls.

Being aware of language

- Introducing the variety of science-related jobs from an early age. For example, our Key Stage 1 and 2 workshops cast children in the role of ‘structural engineer’ or ‘botanist,’ and build their understanding of subject, context, and career possibilities.
- Highlighting that the English language is inherently gendered, and the role this can play in defining children’s norms and identities.

Creating different opportunities for children to explore STEM

- Providing opportunities for children to explore STEM at museums, galleries and science centres.
- Increasing contact with people who work in STEM jobs by bringing them into classroom to talk about their work. This might include parents.

Implementation

Teachers create a positive attitude to science learning within their classrooms and reinforce an expectation that all children are capable of achieving high standards in science. Our whole school approach to the teaching and learning of science involves the following;

- Science will be taught in planned and arranged topic blocks by the class teacher. This is a strategy to enable the achievement of a greater depth of knowledge.
- Through our planning, we involve problem solving opportunities that allow children to find out for themselves. Children are encouraged to ask their own questions and be given opportunities



to use their scientific skills and research to discover the answers. This curiosity is celebrated within the classroom. Planning involves teachers creating engaging lessons, often involving high-quality resources to aid understanding of conceptual knowledge. Teachers use precise questioning in class to test conceptual knowledge and skills, and assess children regularly to identify those children with gaps in learning, so that all children keep up.

- We build upon the learning and skill development of the previous years. As the children's knowledge and understanding increases, and they become more proficient in selecting, using scientific equipment, collating and interpreting results, they become increasingly confident in their growing ability to come to conclusions based on real evidence.
- Working Scientifically skills are embedded into lessons to ensure these skills are being developed throughout the children's school career and new vocabulary and challenging concepts are introduced through direct teaching. This is developed through the years, in-keeping with the topics.
- Teachers demonstrate how to use scientific equipment, and the various Working Scientifically skills in order to embed scientific understanding. There is a clear difference between scientific enquiry and science-based instruction because we understand that children need the opportunity to be taught how to conduct scientific enquiries before undertaking their own enquiries.
- Teachers find opportunities to develop children's understanding of their surroundings by accessing outdoor learning and workshops with experts.
- Teachers ensure that both substantive knowledge (which involves concepts forming the underpinning structure of the subject) and disciplinary knowledge (the knowledge scientists need so they can collect, understand and evaluate scientific evidence) is taught and embedded across the Science curriculum.

At Padbury CE school we use Kapow as a tool for teaching to ensure progression of skills and knowledge is built throughout the school. This enables teachers to be clear on where children need to be at both the end of the year and key stage.

Impact

The successful approach at Padbury CE School results in a fun, engaging, high-quality science education, that provides children with the foundations for understanding the world. Our engagement with the local environment ensures that children learn through varied and first-hand experiences of the world around them. So much of science lends itself to outdoor learning and so we provide children with opportunities to experience this. Through various workshops, trips and interactions with experts and local charities, children have the understanding that science has changed our lives and that it is vital to the world's future prosperity. Children learn the possibilities for careers in science as a result of our community links and connection with national agencies such as the STEM association. Pupil voice is used to further develop the Science curriculum, through questioning of pupil's views and attitudes to Science to support the children's enjoyment of science and to motivate learners.

By the end of Reception most children will attain the Development Matters outcomes for 5 yr olds

Physical Development: Health and Self-Care

- To know the importance for good health of physical exercise, and a healthy diet, and talk about ways to keep healthy and safe.

Understanding the World: The World



- To know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another.

By the end of Key Stage 1,

most pupils will attain the national curriculum outcomes for 7 yr. olds and will be able to:

Working scientifically

The pupil can, using appropriate scientific language from the national curriculum:

- ask their own questions about what they notice
- use different types of scientific enquiry to gather and record data, using simple equipment where appropriate, to answer questions:
 - observing changes over time
 - noticing patterns
 - grouping and classifying things
 - carrying out simple comparative tests |finding things out using secondary sources of information
- communicate their ideas, what they do and what they find out in a variety of ways

Science content

The pupil can:

- name and locate parts of the human body, including those related to the senses (year 1), and describe the importance of exercise, a balanced diet and hygiene for humans (year 2)
- describe the basic needs of animals for survival and the main changes as young animals, including humans, grow into adults (year 2)
- describe the basic needs of plants for survival and the impact of changing these and the main changes as seeds and bulbs grow into mature plants (year 2)
- identify whether things are alive, dead or have never lived (year 2)
- describe and compare the observable features of animals from a range of groups (year 1)
- group animals according to what they eat (year 1), describe how animals get their food from other animals and/or from plants, and use simple food chains to describe these relationships (year 2) describe seasonal changes (year 1)
- name different plants and animals and describe how they are suited to different habitats (year2) distinguish objects from materials, describe their properties, identify and group everyday materials (year 1) and compare their suitability for different uses (year 2)

By the end of Key Stage 2 most children will attain the age-related expectations for 11-year-olds and will be able to:

Working scientifically

The pupil can, using appropriate scientific language from the national curriculum:

- describe and evaluate their own and others' scientific ideas related to topics in the national curriculum (including ideas that have changed over time), using evidence from a range of sources



- ask their own questions about the scientific phenomena that they are studying, and select the most appropriate ways to answer these questions, recognising and controlling variables where necessary (i.e. 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)
- use a range of scientific equipment to take accurate and precise measurements or readings, with repeat readings where appropriate
- record data and results using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- draw conclusions, explain and evaluate their methods and findings, communicating these in a variety of ways



- raise further questions that could be investigated, based on their data and observations.

Science content

The pupil can:

- name and describe the functions of the main parts of the digestive (year 4), musculoskeletal (year 3) and circulatory systems (year 6); and describe and compare different reproductive processes and life cycles in animals (year 5)
- describe the effects of diet, exercise, drugs and lifestyle on how the body functions (year 6)
- name, locate and describe the functions of the main parts of plants, including those involved in reproduction (year 5) and transporting water and nutrients (year 3)
- use the observable features of plants, animals and microorganisms to group, classify and identify them into broad groups, using keys or other methods (year 6) construct and interpret food chains (year 4)
- describe the requirements of plants for life and growth (year 3); and explain how environmental changes may have an impact on living things (year 4)
- use the basic ideas of inheritance, variation and adaptation to describe how living things have changed over time and evolved (year 6); and describe how fossils are formed (year 3) and provide evidence for evolution (year 6)
- group and identify materials (year 5), including rocks (year 3), in different ways according to their properties, based on first-hand observation; and justify the use of different everyday materials for different uses, based on their properties (year 5)
- describe the characteristics of different states of matter and group materials on this basis; and describe how materials change state at different temperatures, using this to explain everyday phenomena, including the water cycle (year 4)
- identify and describe what happens when dissolving occurs in everyday situations; and describe how to separate mixtures and solutions into their components (year 5)
- identify, with reasons, whether changes in materials are reversible or not (year 5)
- use the idea that light from light sources, or reflected light, travels in straight lines and enters our eyes to explain how we see objects (year 6), and the formation (year 3), shape (year 6) and size of shadows (year 3)
- use the idea that sounds are associated with vibrations, and that they require a medium to travel through, to explain how sounds are made and heard (year 4)
- describe the relationship between the pitch of a sound and the features of its source; and between the volume of a sound, the strength of the vibrations and the distance from its source (year 4)
- describe the effects of simple forces that involve contact (air and water resistance, friction) (year 5), that act at a distance (magnetic forces, including those between like and unlike magnetic poles) (year 3), and gravity (year 5)
- identify simple mechanisms, including levers, gears and pulleys, that increase the effect of a force (year 5), use simple apparatus to construct and control a series circuit, and describe how the circuit may be affected when changes are made to it; and use recognised symbols to represent simple series circuit diagrams (year 6)



- describe the shapes and relative movements of the Sun, Moon, Earth and other planets in the solar system; and explain the apparent movement of the sun across the sky in terms of the Earth's rotation and that this results in day and night (year5)

Progression in Science

Progression is ensured through the use of the progression document which teachers refer to inform planning. With disruptions to teaching as a result of the Covid pandemic, the progression document supports in identifying the gaps and how to build those skills from the child's starting points so that all can achieve age related expectations before they leave us in yr6.

Safeguarding

Safety is paramount and all forms of technology should be checked by adults before being used with children. We have ensured our child protection policies cover the use of technology by adults and children within the school.

The school complies with Inspecting Safeguarding in early years, education and skills settings

Appropriate filters and monitoring systems are in place to protect learners from potentially harmful online material.

The school purchases the annual CLEAPPS membership which has risk assessments and resources to support the safe teaching of science.

Special Educational Needs and Disability, and Inclusion

Specialised computing equipment for children with SEN will be purchased from the SEN Budget and will be maintained by TIO.

Lesson plans are to be differentiated to ensure equality of access to all children. For children with special needs, tasks may have to be broken down into small steps, giving them achievable goals, and activities should reinforce the pupil's understanding of content covered previously. In this way all children will be enabled to achieve their full potential.

Padbury CE School is committed to promoting Disability Equality and equality of opportunity for pupils with learning difficulties. When planning and teaching Science staff will make reasonable adjustments to promote equality of opportunity for disabled and nondisabled pupils. This could include;

- allocating adult support
- providing additional support materials (e.g. visual aids such as photographs, Makaton symbols, concept boards)
- providing alternative resources e.g. switch technology which is easy to manipulate, use of alternative materials for pupils with sight or hearing difficulties.
- modifying tasks (e.g. working on the same objectives but with an alternative choice of media, recording work in different ways such as with a digital camera/ verbally/ with a tape- recorder)
- See also 'SEN D Policy'.
- Use of scientific thinking books to show children's understanding of scientific concepts.



Wider impact of Science

Spiritual, Moral, Social & Cultural (SMSC) Development in Science

Spiritual

Science is using evidence to make sense of the world. It has the ability to make us feel both enormously insignificant (compared to the scale of the visible universe) and enormously significant (we are genetically unique). It helps us understand our relationship with the world around us (how the physical world behaves, the interdependence of all living things). Making new discoveries increases our sense of awe and wonder at the complexities and elegance of the natural world. For scientists, this is a spiritual experience and drives us onwards in our search for understanding.

Moral

Whether it's the ethics behind certain medical treatments, the environmental impact of industry, or how government funding is allocated to scientific projects; moral decisions are an important aspect of Science. Scientific discoveries and inventions need to be used responsibly, and decisions made based on evidence (not prejudice). As teachers, we encourage pupils to be both open minded (generating a hypothesis) and critical (demanding evidence) and to use their understanding of the world around them in a positive manner.

Social

Scientists are collaborators. Sharing ideas, data, and results (for further testing and development by others) is a key principle of the scientific method. We encourage pupils to work together on scientific investigations and to share results (to improve reliability). Science has a major impact on the quality of our lives. In Science lessons, pupils consider the social impact (both positive and negative) of science and technology.

Cultural

Science permeates modern culture, and has played a key part in developing it. It is (both currently and historically) an international activity.

In Science lessons, we explore and celebrate research and developments that take place in many different cultures, both past and present. We explore how scientific discoveries have shaped the, beliefs, cultures and politics of the modern world.

Specific examples of Spiritual, Moral Social and Cultural Develop in Science include:

- Learning about the scientific perspective on the start of the universe and the evolution of life (with consideration of religious beliefs)
- Studying and discussing the impact on human beings on the environment, the problems created by industry and possible solutions.
- Investigating the impact of significant scientists from around the world
- Debating and discussing ethical issues in science such as cloning, genetic modification, nuclear power, climate change
- Studying the scientific method and how scientists collaborate to share and test ideas.



