



LEARNING TO LEARN SKILLS EXPLAINED	
1 Reflective	Planning, making, reviewing
2 Teamwork	Collaboration, empathy, listening
3 Resilient	Managing distractions, 'stick ability'
4 Memorable	Questioning, highlighting, making links
Risk Taking	There's a gap, not scared of being wrong

Barham Primary School

Safe, Happy, Learning

Embedding Excellence



Science Curriculum Statement; Intent, Implementation and Impact

Intent: What we want our pupils to learn?

At Barham Primary School, we strive to deliver an ambitious and high-quality science curriculum, which allows our pupils to recognise the significance of science in their everyday lives. Our curriculum also enables children to see the relevance of 4 of our selected Sustainable Development Goals; Good Health & Well-being, Quality Education, Clean water & Sanitation, and Climate Action. We aim to facilitate the ability for all children to make sense of the world they live in and think about what they can do to make a difference in the future.

It is our intent for the science element of our school curriculum to inspire pupils with a curiosity and fascination about natural phenomena and the uses and implications of science, today and for the future that will remain with them for the rest of their lives. Teaching will equip pupils with knowledge about biology, chemistry and physics, how science has changed our lives and how it is vital to the world's future prosperity. By revisiting these areas of learning regularly, pupils will remember more, know more and understand more. As pupils progress, their growing knowledge about science should help them to deepen their understanding of scientific concepts, processes and methods and the implications they have on human existence. We want our pupils to gain confidence and have practical experiences of being scientists through developing their knowledge and skills to explain what is occurring, predict how things behave and analyse results.

Our curriculum has science enquiry at its heart and has been developed to ensure it has breadth and depth and is progressive so that it allows our pupils to build their knowledge, whatever their starting point, to enable them to develop to their full potential and 'aim to be the best they can be'. We encourage our pupils to be curious learners and our science teaching ensures our pupils to develop the necessary disciplinary knowledge as they progress through the school to enable them to become the scientists of the future.

We ensure all children are exposed to high quality science teaching and a range of learning experiences. Science teaching is carefully sequenced to ensure a clear progression of substantive knowledge and disciplinary knowledge. Each lesson is designed to explore and build on children's prior knowledge. This allows for misconceptions to be addressed effectively.

Aims:

We aim for our children to:

- have excellent scientific knowledge and understanding which is demonstrated in written and verbal explanations, solving challenging problems and reporting scientific findings.
- be excited and show enthusiasm about Science as well as have a desire to explore why things happen.
- lead their own learning, asking and responding to their own scientific questions.
- enjoy learning through exploration.
- appreciate the awe and wonder of Science, making links to how, where and why it forms part of their everyday lives.

Research underpinning our practices:

At Barham, we have looked at a variety of research that shows effective teaching in Science. We have designed our curriculum to ensure we have followed the summary of recommendations outlined in the Education Endowment Foundation 'improving primary science guidance report'.

The 6 recommendations we follow are:

- 1) Developing pupils' scientific vocabulary
- 2) Encouraging pupils to explain their thinking, whether verbally or in written form
- 3) Guiding pupils to work scientifically
- 4) Relating new learning to relevant, real world contexts
- 5) Using assessment to support learning and responsive teaching
- 6) Strengthening science teaching through effective professional development

Key concepts:

Through our science curriculum, pupils will develop an understanding of the following key concepts. These concepts are revisited through different units as pupils move through the school. By the end of primary school, children will know and understand these key concepts.

- **Nature**
- **Matter and energy**
- **Systems**
- **Evolution**

Enquiry strategies:

As part of working scientifically, which is embedded throughout all units, pupils will also learn to use a variety of enquiry strategies to answer scientific questions as outlined below. Different questions lead to different types of enquiry and are not limited to fair testing. By the end of primary school, children will be able to use these enquiry strategies confidently and know that different strategies may be needed at different times.

- Observing over time
- Identifying and classifying
- Looking for patterns
- Comparative and fair testing
- Answering questions using secondary sources of evidence

By the end of EYFS:

Early Years explore scientific themes and content through the 'Understanding of the World' strand of the EYFS curriculum. This involves guiding the pupils to develop sense of their physical world, looks at plants and animals, including humans, seasonal changes and begin to investigate materials. They are assessed in the moment according to milestones within the Development Matters attainment targets.

Children are able to identify similarities and differences between themselves and others, places, objects, materials and living things and are able to discuss past and present events in their own lives. They can make simple observations of animals and plants and make sounds with different objects and materials.

By the end of KS1, pupils will:

During Key Stage 1, pupils will experience and observe phenomena (observable events that occur in a natural or designed system), looking more closely at the natural and humanly constructed world around them. They are encouraged to be curious and ask questions about what they notice. Pupils will begin to use simple scientific vocabulary to answer their own questions, using scientific enquiries to draw conclusions.

Pupils will develop knowledge about biology, chemistry and physics, including how this is evident in their local environment. They should understand basic subject-specific vocabulary relating to all disciplines of science and begin to use their working scientifically skills to enhance their scientific awareness.

Pupils will develop their knowledge of physics observing changes across the four seasons and describe the weather associated with each season and how day length varies. Pupils will also apply their mathematical understanding making tables and charts to display their findings.

Pupils will develop their understanding of biology describing the basic needs of animals, including humans, for survival and the main changes in life cycles. Pupils will be able to describe and compare the features of common animals and discuss the importance of exercise, nutrition and hygiene. In chemistry, pupils will name, compare and group a variety of everyday materials and describe their simple, physical properties. They will then investigate the suitability of these materials for particular purposes.

Pupils carry out scientific enquiry inside and outside the classroom asking questions, noticing patterns, grouping and classifying, using secondary sources and carrying out simple comparative tests. Pupils can use iPad to take pictures of different plants throughout the seasons.

Key Stage 2, pupils will:

During Key Stage 2, pupils broaden their scientific view of the world around them and extend and develop their understanding of biology, physics and chemistry. They explore, discuss, test and develop ideas about everyday phenomena and the relationships between living things and familiar environment. They encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. Pupils also begin to recognise that scientific ideas can change and develop over time as technology progresses. They will develop their knowledge of significant individuals linked to scientific exploration and understanding.

Pupils extend their physics knowledge when they learn about simple series circuits, recognise and explain why materials are good conductors and insulators and identify common appliances that run on electricity. This is further extended to use simple apparatus to construct and control a series circuit and describe how the circuit may be affected when changes are made to it. Pupils will be able to recognise and use symbols to represent simple circuits in diagrams. Pupils develop their understanding of forces, initially looking at magnetism before exploring gravity, air resistance and water resistance. Children will develop their knowledge and understanding of Earth and space and will be able to understand the theory of gravity. Pupils will explore light, discussing its properties and how shadows are created and the patterns in how they change. This is then extended to identify how light travels in straight lines and how it enters our eyes to explain how we see things. Pupils will also identify how sounds are made, vibrations and the relationships of pitch, volume and the source of the sound. Children will be introduced to the idea of using technology to measure things such as sound.

Pupils will build on their understanding of biology, identifying and describing the functions of different parts of flowering plants, the requirements of plants for life and growth and how they vary from plant to plant. They will investigate how water is transported within plants before extending their knowledge further and explore plant reproduction. Pupils' understanding of animals, including humans, will be deepened with pupils acquiring knowledge about skeletons, muscles, the digestive system, food chains and the circulatory system. Pupils will describe the life cycles of animals, including humans, in more depth and understand the effects of diet, exercise, drugs and lifestyle on the human body. They will classify a wider variety of plants, animals and microorganisms and describe how living things have changed over time and evolved using the basic ideas of inheritance, variation, adaptation and evolution.

Pupils' chemistry knowledge is extended through comparing and grouping rocks and soils considering their formation and discussing their physical properties. They will develop an understanding of the different states of matter, how states of matter change (including the water cycle), investigate solutions and how mixtures might be separated through different processes. Investigations will take place to look at reversible and irreversible changes and the uses of everyday materials using comparative and fair tests.

Pupils will continue to develop their scientific enquiry skills by asking a range of different scientific questions, observing closely using simple equipment, recording and presenting evidence, answering questions and concluding, interpreting and communicating results and evaluating on the successes of different enquiry approaches. Further questions will be raised by the pupils as they further deepen their scientific understanding which could be investigated, based on data and observations.

Implementation: How we plan and teach Science?

At Barham Primary School, we follow the National Curriculum and deliver an ambitious, progressive Science curriculum that enables children to see the relevance of science in their own lives, and imagine future science related careers based upon it.

Working scientifically disciplinary knowledge is embedded throughout alongside the substantive knowledge to ensure clear progression towards carefully identified end points. Lessons have clearly defined outcomes and pupils are taught using effective teaching sequences which include modelling, retrieval practices, independent work and feedback.

Teaching and Learning:

Our curriculum is centred upon our selected global goals and key concepts. This requires deep thinking, exploration, discussion, investigating and researching. The clear progression ensures that children are continually building on their prior learning as they systematically develop their understanding of key ideas and their scientific skills. Pupils have opportunities to ask their own questions and consider which types of scientific enquiry are likely to be the best way of answering them. Our pupils draw conclusions and use scientific vocabulary to discuss and present their findings in a range of different ways.

The substantive knowledge has been organised around the key concepts, which are revisited as pupils' progress through the school. Knowledge organisers are used to help children consolidate and retain the science knowledge they have learnt and also to reinforce key scientific vocabulary from each unit. They also encourage an independent approach to learning. KWL grids give teachers an insight into what the children already know and what they would like to know. They also highlight any key misconceptions that need to be addressed.

Supporting pupils in science, including pupils with special educational need and/or disabilities (SEND):

At Barham, we recognise that in all classes, children have a wide range of ability in Science, and we seek to provide suitable learning opportunities for all children by matching the challenge of the task to the ability of the child. Any adaptations made to support pupils' learning in Science usually should not be to the overall curriculum content but rather to how the content is taught. Ensuring that all pupils otherwise encounter the same content is particularly important given the role that key information has in facilitating learning in Science. It is likely that pupils will benefit most from support that combines extra attention to securing the most productive knowledge, while ensuring that all pupils are able to learn about events and periods in a rich context and through meaningful examples.

This can be achieved by:

- setting tasks which are open-ended and can have a variety of responses, particularly being tailored to the child's preferred method of communication.
- setting tasks of increasing difficulty, some children not completing all tasks.
- grouping children by ability in the room, and setting different tasks for each ability group.
- providing resources of different complexity, depending on the ability of the child.
- using learning assistants to support children individually or in groups.
- having experiments that are tailored to sensory/physical needs of different children.

Assessment and Recording:

At Barham Primary School, assessment is an integral part of the teaching process. Teachers use a range of effective assessment strategies to inform the planning and teaching of Science. Children record their learning in science books which also displays their practical learning. The assessment of children's work is on-going to ensure that understanding is being achieved and that progress is being made. Feedback is given to the children as soon as possible and marking work will be guided by the school's Marking Policy.

Assessment is used to check whether pupils have acquired the intended learning during lessons and to inform future teaching. Teachers understand that for pupils to learn, knowledge and skills need to become embedded in long-term memory. To ensure this happens, all lessons are planned

to build on what has been taught before and work towards defined end points. Teachers ensure pupils have a secure understanding of the learning intention and can use and apply their knowledge and skills fluently and independently. Children complete an end of unit assessment to show their understanding and ability to apply knowledge and skills learnt. In KS1, these are called missions. The assessment results and target sheets are used to inform whether a child is working at the expected level. All teachers are supported to develop expert subject knowledge in science through high-quality CPD, both from within school and from sharing resources from external providers.

The successful, collaborative approach to the teaching of science across the school results in an engaging, high quality education that allows pupils to understand the world around them and encourages them to explore science further as they leave primary school.

Monitoring:

Monitoring takes place regularly through sampling children's work, teacher planning, pupil voice, book looks, learning walks and lesson visits. Monitoring is taken place by the subject leaders and strategic lead. Subject leader keeps up to date with relevant practices and regularly attends network meetings to share and learn from other subject leaders in the local area.

Cross curricular:

Staff are encouraged to develop cross-curricular links with Science and other subjects to provide a relevant and meaningful curriculum for pupils.

Mathematics: The teaching of science contributes to children's mathematical understanding in a variety of ways. Children use data, gained from scientific investigations and choose to present this in a variety of ways including tables and graphs. Children also learn to interpret information presented in graphical or pictorial form.

Computing: Wherever appropriate we use computing to enhance our teaching of science. The children use ICT in a variety of ways, such as word-processing, finding information on the Internet and presenting information through PowerPoint during homeworks.

Impact: What we achieve by delivering Science in this way?

The successful, collaborative approach to the teaching of science across school results in an ambitious, engaging, high quality education that allows pupils to understand the world around them and encourages them to explore science further as they leave primary school.

Our pupils develop the knowledge, skills and cultural capital needed to ensure they successfully progress onto the next stage in their education and life and develop into responsible, respectful and resilient citizens.

By the end of Primary school, children will:

- Pupils have an understanding of the key areas of knowledge and can use key concepts to make links between the areas
- Pupils can ask questions and make observations about the world around them using scientific knowledge
- Pupils can analyse data and draw conclusion which they can then articulate
- Pupils are able to follow and design scientific enquiries
- Pupils will begin to have an understanding of some of the major issues facing our planet and an appreciation of the importance of science to wider society