



Science is a core subject. At Bilston CE Primary School, we believe that we need to equip our children with scientific enquiry skills and good subject knowledge. At Bilston CE Primary School, we have adopted the Collins Snap Science schemes of work. These schemes enable our children to learn science through a variety of different investigative approaches. The scheme allows progression of skills and builds on previous subject knowledge. It also promotes lots of outdoor learning opportunities and looks at local environmental issues.

Every lesson has a focus enquiry skill at the heart of it. The curriculum also exploits opportunities for using key literacy, numeracy and computing skills. Children are assessed at the end of each unit and they work towards enquiry skills targets. In Key Stage 1 children are taught biology and chemistry focused topics. In Key Stage 2 children are taught biology, chemistry and physics focused topics.

Aims and Objectives

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.

EYFS

During the Early Years Foundation Stage, science is included in the area of learning known as Understanding the World. The focus within this area of learning is The World.

Children will develop key skills and have first-hand experiences in order to meet their learning needs and requirements to meet the ELG. In the EYFS scientific learning occurs through:

- Access to a range of developmentally appropriate practical activities based on first-hand exploratory experiences. E.g. nature walks, magnifiers to explore natural objects, manipulating wet/dry sand.
- Enthusiastic and meaningful interaction with adults, who provide opportunities to develop communication skills, use correct scientific language and carefully framed open ended questioning techniques to develop thinking skills.

Abstract

Our whole curriculum is shaped by our school vision, which aims to enable all children, regardless of background, ability or additional needs, to flourish and become the very best version of themselves they can possibly be. We teach the National Curriculum requirements, supported by clear skills and knowledge progression for each year group and key stage. This ensures that skills and knowledge are built upon year on year and sequenced appropriately to maximise learning for all children.

- Exploration of both indoor and outdoor environments linking all areas of learning.
- Recognition and extension of their existing knowledge and understanding gained from their home setting.
- An aspect of exploratory understanding the world needs to happen on a daily basis as part of continuous provision.
- Outdoor exploratory activities need to be happening throughout the week to enhance attainment in the ELG.

KS1

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. At Bilston CE Primary pupils should be encouraged to be curious and ask questions about what they notice. Pupils 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. Pupils 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.

Pupils should read and spell scientific vocabulary at a level consistent with their increasing word reading and spelling knowledge at key stage 1.

Opportunities for using and applying maths skills e.g. handling data, graphs and measures should be exploited appropriately through the curriculum with age related expectations.

Years 1 & 2

During years 1 and 2, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- ♣ asking simple questions and recognising that they can be answered in different ways
- ♣ observing closely, using simple equipment
- ♣ performing simple tests
- ♣ identifying and classifying

- ♣ using their observations and ideas to suggest answers to questions.
- ♣ gathering and recording data to help in answering questions.

KS2

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. Pupils should read and spell scientific vocabulary correctly and with confidence, using their growing word reading and spelling knowledge.

Opportunities for using and applying maths skills e.g. handling data, graphs and measures should be exploited appropriately through the curriculum with age related expectations.

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.

Pupils should read, spell and pronounce scientific vocabulary correctly. Opportunities for using and applying maths skills e.g. handling data, graphs and measures should be exploited appropriately through the curriculum with age related expectations.

Years 3 & 4

During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- ♣ asking relevant questions and using different types of scientific enquiries to answer them
- ♣ setting up simple practical enquiries, comparative and fair tests
- ♣ making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- ♣ gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- ♣ recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- ♣ reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- ♣ using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- ♣ identifying differences, similarities or changes related to simple scientific ideas and processes
- ♣ using straightforward scientific evidence to answer questions or to support their findings.

Years 5 & 6

During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- ♣ planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- ♣ taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- ♣ recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- ♣ using test results to make predictions to set up further comparative and fair tests
- ♣ reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations
- ♣ identifying scientific evidence that has been used to support or refute ideas or arguments.

Ambition

To ensure school meets the requirements of the National Curriculum and to enable all children to succeed in science right from Foundation Stage children are provided with opportunities to

access the science curriculum. However, formal assessment and the teaching of Key Skills begins in Year 1 through to Year 6. Children are assessed against the following key areas:

- Working scientifically
- Plants
- Animals, including humans
- Every day materials
- Seasonal change
- Living things and their habitats
- Rocks
- Light
- Forces and magnets
- States of matter
- Sound
- Electricity
- Earth and space
- Properties and change of materials
- Inheritance and evolution

	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
Year 1	Using our Senses	Everyday Materials	Looking at Animals	Our Changing World: Animal Antics	Plant Detectives	Our Changing World: Plants/Sensing Seasons
Year 2	Materials: Good Choices	Materials: Shaping Up	The Apprentice Gardener	Growing Up	Take Care	Our Changing World/What Is In Your Habitat?
Year 3	Rock Detectives	Can You See Me?	The Power of Forces	Amazing Bodies	How Does Your Garden Grow?	Our Changing World
Year 4	Switched On	Good Vibrations	Where Does All That Food Go?	Who Am I?	In a State	Human Impact
Year 5	Everyday Materials/ Get Sorted	Marvellous Mixtures/ Materials: All Change	Feel The Force	Circle of Life	Reproduction in Plants and Animals	The Earth and Beyond
Year 6	The Nature Library	Light Up Your World	Everything Changes	Body Pump/Body Health	Danger! Low Voltage	Our Changing World

Staff have two hours per week timetabled to deliver Key Skills linked to each area throughout the year. Once these skills have been taught the intention is that they can be applied to other curriculum areas. Although skills lessons are set to ensure all areas are covered, Year group teams work together to find exciting and innovative ways to teach these skills and embed them across the other curriculum areas to allow for creativity and innovation and to ensure implementation occurs.

Keys Skills and what is covered:

Scientific knowledge and conceptual understanding

The programmes of study describe a sequence of knowledge and concepts. While it is important that pupils make progress, it is also vitally important that they develop secure understanding of each key block of knowledge and concepts in order to progress to the next stage. Insecure, superficial understanding will not allow genuine progression: pupils may struggle at key points of transition (such as between primary and secondary school), build up serious misconceptions, and/or have significant difficulties in understanding higher-order content.

Pupils should be able to describe associated processes and key characteristics in common language, but they should also be familiar with, and use, technical terminology accurately and precisely. They should build up an extended specialist vocabulary. They should also apply their mathematical knowledge to their understanding of science, including collecting, presenting and analysing data. The social and economic implications of science are important but, generally, they are taught most appropriately within the wider school curriculum: teachers will wish to use different contexts to maximise their pupils' engagement with and motivation to study science.

The nature, processes and methods of science

'Working scientifically' specifies the understanding of the nature, processes and methods of science for each year group. It should not be taught as a separate strand. The notes and guidance give examples of how 'working scientifically' might be embedded within the content of biology, chemistry and physics, focusing on the key features of scientific enquiry, so that pupils learn to use a variety of approaches to answer relevant scientific questions. These types of scientific enquiry should include: observing over time; pattern seeking; identifying, classifying and grouping; comparative and fair testing (controlled investigations); and researching using secondary sources. Pupils should seek answers to questions through collecting, analysing and presenting data. 'Working scientifically' will be developed further at key stages 3 and 4, once pupils have built up sufficient understanding of science to engage meaningfully in more sophisticated discussion of experimental design and control.

Spoken language

The national curriculum for science reflects the importance of spoken language in pupils' development across the whole curriculum – cognitively, socially and linguistically. The quality

and variety of language that pupils hear and speak are key factors in developing their scientific vocabulary and articulating scientific concepts clearly and precisely. They must be assisted in making their thinking clear, both to themselves and others, and teachers should ensure that pupils build secure foundations by using discussion to probe and remedy their misconceptions.

Teaching and Learning

All pupils will receive 1.5 hours are timetabled weekly for science. These lessons follow the Collins Snap Science scheme of work for science and standalone from our International Primary Curriculum (IPC). All lessons have a scientific enquiry focus as well as a knowledge focus to the lesson. Science lessons are well linked to exploit key literacy, numeracy and computing skills. All units have additional extension lessons to challenge, further and deepen the levels of children's knowledge and understanding. Approximately 40% of the Snap Science curriculum can exploit outdoor learning links.

All lessons have clear learning objectives that are mapped out in the medium term planning and we use the Chris Quigley learning objectives. Learning objectives are shared and reviewed effectively with pupils. A variety of strategies, including questioning, discussion, concept mapping and marking are used to assess progress and pupils are encouraged to decide on the best form of communicating their findings. teacher's assess children's knowledge and skills on a regular basis (AfL) to inform their next steps for learning.

Activities are planned to challenge, motivate, and extend pupils learning. They must inspire pupils to experiment and investigate the world around them and too participate in a range of activities. These include:

- asking questions
- locating sources of information
- observation
- selecting appropriate equipment and using it safely
- discussion
- planning investigative work
- investigation
- raising ideas and prediction
- testing
- collecting evidence, measuring and checking results
- handling evidence
- making comparisons
- describing patterns
- communicating results and findings.

Key Skills

To ensure Key Skills are delivered and the progression is evident and appropriate to each year group and key stage, these lessons are provided for all staff to ensure adequate depth and breadth of the subject. A key skills lesson is timetabled for each class once per week from Year 1 to Year 6. Foundation Stage have access to these key skills lessons, which are frequently used throughout the school year.

Effective Subject Leadership

The Science lead Miss A Wright has an interest in and a passion for the way science can be used and taught in cross-curricular ways alongside skills lessons. Through regular reading, research and attendance of termly co-ordinator meetings provided by the authority new resources and equipment are introduced regularly to create a fun and engaging curriculum. The coordinator also works closely with other subject leaders to ensure they have the resources required to deliver their subjects effectively whilst implementing the use of technology. EG: Science – Digital Microscopes/Log Boxes. Data is also analysed and shared regularly with staff and good practise is shared. Questionnaires are also sent out yearly to our:

- Children (to allow us to gain a pupil voice)
- Parents (to ensure we are meeting the needs of and working closely with our families)
- Staff (to ensure CPD is effective)

The coordinator also reports to Governors regularly to discuss data and progress and to ensure school are meeting the needs of our local community. The school also holds the Primary Science Quality Mark – Silver Award.

Marking and Feedback

Marking in science follows the whole school marking policy which should include development steps. Questions are also asked in marking which are science specific. Teachers mark work on a regular basis, after each piece of recorded work is completed and marking will inform next steps for learning. Time is allocated for children to discuss their learning with teachers and respond to teach feedback in marking.

Aspire to STEM Partnership

The school has enrolled in a partnership, in order to develop STEM learning. The Aspire to STEM partnership hopes to develop STEM learning across the school by embedding the key skills of Science, technology, engineering and mathematics. The school has been working closely with a cluster of other primary and secondary schools, sharing ideas and overseeing expenditure so that the school can develop staff CPD surrounds all elements of STEM. The funding will also go towards external agencies visiting the school to complete experiments, investigations and inquiries as part of a school visit.

A Broad and Balanced Curriculum

A broad and balanced curriculum is offered with many opportunities for science skills to be applied to other areas of the curriculum. Flexible planning and a wealth of resources allow staff to be creative in their delivery and children to be creative in their learning. It also allows children to work beyond the school day with parents.

Planning a Progressive Model:

The skills lessons are progressive to enable staff to understand the standard they should be aiming for and a whole school guide is provided and is shared on the Collins Connect programme. This identifies which lessons are appropriate for each year group.

Moderation

Each year group takes part in phase moderation. As science is teacher assessed at the end of each topic, moderation sessions are planned into staff meeting time so that judgements can be discussed and finalised. There are clear moderation sheets that are provided for each year group that show an overview of each topic. Teachers will make their judgements and complete the feedback sheets that identify the initial judgement and the post-moderation judgement.

School Grants

Over the last few years, the school has applied for two grants which have enabled the children to have access to a wealth of new, updated resources, many of these with a link to STEM learning. This Edina Trust Grant has been awarded to the school for the last two years and therefore the children have had access to £600 worth of resources to support 'forensics and the human body' and also £600 worth of 'STEM curiosity boxes.' In addition to this the school was awarded the British Science Week Kick Start Grant, which allowed the school to spend £700 on an external agency, who visited and worked with all classes in KS2 completing forensic workshops.

Science Day

As part of the science curriculum, every year the school engages in a whole school 'Science Day'. This is a day devoted entirely to science and STEM learning. Each year there is a clear theme that runs through all of the lessons and activities that take place throughout the school day. Parents are invited into school to help and support their children during different times to complete a range of experiments and investigations. An assembly is then held at the end of the day to celebrate the children's achievements and a child from each class is awarded the 'STEM Ambassador Award'.

Assessment

Formal assessment and the teaching of science key skills begins in Year 1 through to Year 6. Foundation Stage are not formally assessed as they are exploratory learners at this stage. Other children are assessed against the following key areas:

<p><u>Year 1</u></p> <p>Working scientifically</p> <p>Plants</p> <p>Animals, including humans</p> <p>Everyday materials</p> <p>Seasonal change</p>	<p><u>Year 2</u></p> <p>Working scientifically</p> <p>Plants</p> <p>Animals, including humans</p> <p>Everyday materials</p> <p>Living things & their habitats</p>	<p><u>Year 3</u></p> <p>Working scientifically</p> <p>Plants</p> <p>Animals, including humans</p> <p>Rocks</p> <p>Light</p> <p>Forces and magnets</p>
<p><u>Year 4</u></p> <p>Working scientifically</p> <p>Living things & their habitats</p> <p>Animals, including humans</p> <p>States of matter</p> <p>Sound</p> <p>Electricity</p>	<p><u>Year 5</u></p> <p>Working scientifically</p> <p>Living things & their habitats</p> <p>Animals, including humans</p> <p>Properties and change of materials</p> <p>Earth & space</p> <p>Forces</p>	<p><u>Year 6</u></p> <p>Working scientifically</p> <p>Living things & their habitats</p> <p>Animals, including humans</p> <p>Evolution and inheritance</p> <p>Light</p> <p>Electricity</p>

We use the STAT Sheffield system to assess the children to ensure a uniformed approach with other subjects. We began using this system in 2018. It is based on how many children are:

- **Below**
- **Working Towards**
- **On Track**
- **Exceeding**

A child is judged as exceeding if they are independent learners in their year group as well as show the ability to use applications within other applications or programmes. They must also be able to respond to feedback and disseminate these skills in class.

The implementation of this curriculum ensures that when children leave Bilston Church of England Primary School, they are competent in all areas of the science curriculum with an in depth understanding of the world around them.

They will have developed skills to express themselves and be creative in using scientific investigation and be equipped to apply their skills in science to different challenges moving forward.

Monitoring and Evaluation

The curriculum subject leader is responsible for the monitoring and evaluation of their own subject area. Additional management time is given to subject leaders upon request to enable them to successfully carry out their roles and responsibilities, without adding to workload. This may take place via learning walks with a member of SLT staff or with link governors. The information from the monitoring and evaluation then forms the basis of the impact assessment for the curriculum area.

Judgements on the impact of the curriculum on pupils is based upon a triangulation of different monitoring and evaluation activities within school. Work and book scrutiny, pupil voice discussions, outcomes of assessments and quality of teaching and learning are all used as tools to help senior leaders and the coordinator assess the impact of the curriculum.

Outcomes for Pupils

Our curriculum consistently leads to good outcomes and results for the pupils at Bilston Church of England Primary School. Since implementing the use of our STAT assessment system (2019) school have generally shown an upward trend in Science. Year 3 experienced a slight decline in ARE children due to staffing changes and behaviour issues.

However, pupils with additional learning needs also made good progress in the subject in line with their own progress measures. Assessment of these pupils is completed in much smaller and achievable steps.

How we are Improving Science in 2022-2023

- Monitoring of standards in science, to ensure enquiry is at the heart of the curriculum.
- Further develop opportunities for Maths and ICT to support Science.
- Assess Children's progress effectively.
- Developing staffs understanding of the different aspects of STEM learning and embedding these within science lessons.