

St Paul's C of E Primary School



SCIENCE POLICY

1. Purpose of the policy

This policy reflects the aims and values of St. Paul's CE Primary School. It ensures all stakeholders, including staff, governors, parents and pupils, are working towards the same goals.

The purpose of this policy is to:

- Set out a framework for all teaching and non-teaching staff, giving guidance on planning, teaching and assessment
- Demonstrate adherence to the National Curriculum objectives and guidelines
- Provide clear information to parents and carers about what their children will be taught
- Allow the governing board to monitor the curriculum
- Provide Ofsted inspectors with evidence of curriculum planning and implementation

2. Subject vision

At St. Paul's, science forms a key part of our core curriculum from when children join us in nursery through to their transition to secondary school. The development of scientific knowledge and skills equips children with the tools they need to understand the world around them. Science unlocks their inquisitive minds and provides opportunities for awe and wonder. Our children enjoy learning science and love to discover new ideas, building on their prior knowledge.

Our vision is that all children learn the foundational ideas they will need to succeed in science at secondary school and beyond. Our enthusiastic teachers provide opportunities for children to discover scientific concepts for themselves through investigations, demonstrations and research. Staff direct children and challenge misconceptions to ensure they are developing a secure knowledge base.

3. Intent: Aims and outcomes

By the time our pupils leave St. Paul's, they should:

- 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

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
- Develop their understanding of scientific ideas by using different types of scientific enquiry to answer the own questions
- Observe changes over a period of time
- Notice patterns
- Group and classify things
- Carry out simple comparative tests
- Find things out using secondary sources of information
- 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

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
- Developing their ideas about functions, relationships and interactions

- › Asking their own questions about what they observe and make some decisions about which types of scientific enquiry they are likely to be the best ways of answering them
- › Observing changes over time
- › Noticing patterns
- › Grouping and classifying things
- › Carrying out simple comparative and fair tests
- › Finding things out using secondary sources of information
- › Draw simple conclusions
- › Use some scientific language, first, to talk about and, later, to write about what they have found out

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
- › Analysing functions, relationships and interactions more systematically
- › Encountering more abstract ideas and begin to recognize how these ideas help them to understand and predict how the world operates
- › Recognising that scientific ideas change and develop over time
- › Selecting the most appropriate ways to answer science questions using different types of scientific enquiry
- › Observing changes over different periods of time
- › Noticing patterns
- › Grouping and classifying things
- › Carrying out comparative and fair tests
- › Finding things out using a wide range of secondary sources of information
- › Drawing conclusions based on their data and observations
- › Using evidence to justify their ideas
- › Using scientific knowledge and understanding to explain their findings

Working Scientifically

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

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

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 a 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

4. Implementation: Teaching and learning

At St. Paul's, we use a variety of teaching and learning styles in science lessons. Our principle aim is to develop children's knowledge, skills and understanding through enquiry and investigation. Lesson plans are based around the scheme of work with objectives adapted to suit the stage of development for the pupils in each class. The teaching of science might involve:

- › Whole-class teaching or an enquiry-based research activity
- › Small group discussions
- › The children asking, as well as answering, scientific questions
- › A variety of data, such as statistics, graphs, pictures and photographs
- › ICT to enhance their learning
- › A real first-hand practical activity where they can work scientifically
- › Appropriate secondary sources, such as books, photographs and videos
- › Role play/drama-based activities
- › Field trips/external speakers

At St. Paul's, we recognise that in all classes children have a wide range of scientific abilities, and we ensure that we provide suitable learning opportunities for all children by matching the challenge of the task to the ability of the child. We achieve this in a variety of ways:

- › We set tasks which are open-ended and can have a variety of responses
- › We set tasks which can be adapted for different children either to increasing difficulty or support them
- › We group children by ability for some tasks, in mixed ability groups for others and independently for some tasks. Sometimes each type of grouping will have different activities, other times this may just include having additional support offered to them
- › We provide resources of different complexity, matched to the ability of the child
- › We use adults in the classroom to support the work of individual children or groups of children.

5. Curriculum overview

Here at St. Paul's, pupils will follow a science curriculum that gradually develops learning, the outcome being the acquisition of knowledge and skills that enable each pupil to understand the world around them. Children will be able to know more, remember more and do more. Science is taught and planned as a discrete subject. We carry out our curriculum planning in three phases: whole-school overview, schemes of work and short-term plans.

Our whole-school overview maps out the science topics studied each half term during each year group:

Science Overview Nursery – Y6						
	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
N	Nursery Rhymes Looking at settings of nursery rhymes Gravity	It's Me! Observe the effects of physical activities on their body.	Transport on Land Pushes	Growing Plants	The Farm Developing an understanding of growth and change over time.	The Seaside Beginning to describe the texture of things
R	Me and My Community Similarities, differences, patterns and change To show some understanding that good practices with regard to exercise, eating, sleeping and hygiene	Traditional Tales Shadows Healthy eating	Other Forms of Transport Floating and sinking Materials to build a boat Pushes and pulls	Life Cycles	African Animals Comparing adult and young.	The Seaside Living things at the seaside
Y1	Animals including Humans Name common animals Carnivores etc. Adaptation	Seasonal Changes The four seasons Seasonal weather Length of day	Animals including Humans Human body & senses	Seasonal Changes The four seasons Seasonal weather	Plants Common plants Basic plant structure	Everyday Materials Physical properties of materials Grouping materials Changing shapes of solid objects
Y2	Everyday Materials Identify different materials Name everyday materials Properties of materials	Everyday Materials Properties of materials Reduce, Reuse, Recycle	All Living Things & Their Habitats Alive & dead, life processes, adaptation Micro habitats & food chains	Plants Plant & seed growth Plant reproduction Keeping plants healthy	Animals including Humans Animal reproduction & growth Basic needs & Healthy living	Animals including Humans How does exercise affect our bodies?
Y3	Rocks Compare and group rocks Describe fossil formation Recognise soil composition	Forces Different forces magnets	Light Light reflection off surfaces shadows	Plants Basic structure & functions Plant life & growth	Plants Life cycle of plants Water transportation	Animals including Humans Human skeleton & muscles Nutrition Exercise & health
Y4	Electricity Uses of electricity Simple circuits & switches Conductors & insulators	Sound How sounds are made Sound vibrations Pitch volume		Animals including Humans Teeth/ The digestive system Food chains	States of Matter Compare & group materials Solids, liquids & gases Changing state The water cycle	All Living Things & Their Habitats Grouping living things Classification keys Adaptation of living things
Y5	All Living Things & Their Habitats Life cycles plants & animals Reproductive processes Famous naturalists	Properties and Changes of Materials – Forces Gravity Friction & resistance Forces & motion of mechanical devices	Properties and Changes of Materials Compare properties of everyday materials Soluble/dissolving Reversible/Irreversible changes Fair testing	Earth and Space Movement of the Earth & planets Movement of the moon S, E & M as spherical bodies Night & day	Animals including Humans The changes as humans develop from birth to old age	Animals including Humans Working scientifically The importance of exercise
Y6	Evolution and inheritance Identical/non-identical offspring Fossil evidence & evolution Adaptation & evolution	Light How light travels Reflection Splitting light Ray models of light	Animals including humans The circulatory system Effects of a healthy lifestyle Water transportation <i>Famous scientists and their contributions to the world</i>	All living things & their habitats Classification of living things Reasons for classification	Electricity Electrical components Simple circuits Fuses Voltage	

Our schemes of work outline the knowledge nuggets taught in each topic and are based on the objectives found in the National Curriculum

(https://assets.publishing.service.gov.uk/media/5a806ebd40f0b62305b8b1fa/PRIMARY_national_curriculum_-Science.pdf). Our science curriculum is planned in topics, so that it builds on prior learning and ensures all the basic skills are developed. This also allows for the progression of knowledge through the themes in science i.e plants. All children have access to knowledge organisers for reference and consolidation of skill information and vocabulary. Our knowledge organisers can be found on the school website: <https://www.stpaulsce.co.uk/year-group-curriculum-overviews/>

6. Cross-curricular links

Science shares links with the following subjects:

- English: development of literacy skills through reading, writing, speaking and listening and learning new and specific scientific language
- Maths: estimating, predicting and analysing numerical data and recording data in various graphs and tables
- ICT: use of the internet for research and to find, select and analyse information. Video clips are also used to animate and model scientific concepts and allows children to investigate processes which would be impossible to do directly in the classroom otherwise.

Our science curriculum offer highlights how science impacts the rest of school life:

<https://www.stpaulsce.co.uk/science-28/>

7. Impact: Assessment and recording

Assessment

St. Paul's uses assessment to enable staff to understand what pupils have learnt before, what they need to learn now and what they will learn next.

Formative assessment

Formative science assessment is ongoing and will be used to inform teachers in relation to their planning, lesson activities and differentiation. During lessons, teachers will make informal judgements continuously. At the end of the lesson, the teacher assesses the pupil's work and will make a judgement to inform future planning. Feedback (either written or verbal) is given to each child to help guide their progress.

Summative assessment

Summative assessment is completed termly, based on the scientific skills and knowledge nuggets found on the schemes of work. This will be completed using teacher assessment. Teachers will use assessment checkpoints throughout the unit and the assessment criteria on the schemes of work to make their judgements.

At the end of each school year, pupils will be assessed within 1 of the following bands:

- Has Not Met the expected standard (HNM)
- Working at Expected Standard (EXS)

Statutory assessment

Teachers make an assessment of science at the end of Key Stage Two.

Further assessment information can be found in the school's assessment policy.

Marking

Children receive regular verbal and written feedback and marking follows the school's marking policy.

Further marking information can be found in the school's marking policy.

Recording

In science, pupils will record their learning in the following ways:

- Science books
- Seesaw

This may take the form of photographs, pictures, notes or written work, and may be worksheet-based or fully independent.

8. Enrichment Curriculum & Resources

External speakers, local museums, trips

- Visitors (e.g. Electricity Workshop)
- Altru Learn and perform days (e.g Plants)
- Museum trips (e.g. Manchester Museum for fossils)
- Trips to scientific sites (e.g Jodrell Bank)

9. Roles and responsibilities

Headteacher

The headteacher at our school will:

- Support the subject leader but also hold them to account for the effectiveness of the subject
- Support staff through the provision of training and resources
- Monitor the planning and delivery of the subject
- Ensure the requirements of the National Curriculum are met
- Ensure this policy is reviewed according to the timescales set out

Subject leader

The subject leaders at our school will:

- Prepare and review subject policy and curriculum plans
- Promote the study of the subject throughout the school
- Monitor the teaching and assessment of the subject (using subject leader journal)
- Attend appropriate CPD
- Stay informed regarding developments in the study and teaching of the subject
- Evaluate resources
- Provide support, training and CPD to staff on the subject curriculum and its delivery, and keep them informed about subject developments nationally
- Assess the impact of the subject curriculum on pupils' learning and development
- Make presentations to governors on the subject and how it is being taught
- Provide the Headteacher with a summary report in which the strengths and weaknesses of science are evaluated and indicated areas for further development

Classroom teacher

Classroom teachers at our school will:

- Plan, teach and assess the subject according to the principles laid out in this policy
- Report to the subject leader
- Maintain subject knowledge and appropriate CPD

Parents

The parent community at our school will:

- Make sure their children are prepared for learning
- Support their children to complete project book activities

10. Inclusion

At St. Paul's, teachers set high expectations for all pupils in science, whatever their ability and individual needs.

Science forms part of the school curriculum policy to provide a broad and balanced education to all children and we acknowledge that learners with additional needs are likely to experience difficulties within their learning which may act as barriers. Through our science teaching, we provide learning opportunities that enable all pupils to make good progress by adapting the teaching of science to suit the needs of all pupils. We strive hard to meet the needs and will use appropriate assessment to set ambitious targets and plan challenging work for all groups, including:

- More able pupils
- Pupils with low prior attainment
- Pupils from disadvantaged backgrounds
- Pupils with special educational needs (SEN)
- Pupils with English as an additional language (EAL)

Teachers carefully consider these adaptations as shown below:

Cognition and Learning	
Barriers	Provision
Information may not be understood or retained Memory/consolidation skills	<ul style="list-style-type: none"> ➤ Prepare the children prior to the lesson with a pre-teach introducing key knowledge/vocabulary. ➤ Consider the accessibility of science demonstrations. Plan the demonstration area so that it is clearly laid out, uncluttered and gives all children a clear view. ➤ Use the working walls and whiteboard to show the focus of each lesson and how it fits in the sequence of lessons. How do lessons link together to develop their scientific knowledge? ➤ Use symbols, images or objects to make it more accessible.

	<ul style="list-style-type: none"> ➤ Invite children to list the key points from the lesson under specific headings – e.g. in an investigation: what they were trying to find out, how they went about it, how they controlled the variables, what happened, suggested reasons for what happened and what they will do next? Review the key knowledge from the lesson. ➤ Use mnemonics to help children remember things like the order of the colours in a rainbow or the orders of the planets. ➤ Encourage the use of mind maps/pictures/flow charts.
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Communication and Interaction

Barriers	Provision
Understanding and using scientific vocabulary	<ul style="list-style-type: none"> ➤ Recognise that the language of science may be challenging for many children – for example: The specific scientific use of everyday words such as 'weight', or terms specific to science, such as 'electrical circuit'. ➤ Pre-teach key vocabulary, then ensure multiple and regular exposure to these words including referring to knowledge mat and make them clearly visual in the classroom environment. ➤ Label equipment with a symbol and word (dual coding). ➤ Explicitly teach the meaning of key scientific vocabulary in lessons. ➤ Check children's' understanding by inviting them to reformulate explanations in their own words or in other ways. For example, after an investigation of floating and sinking, ask children to explain what happened using diagrams, as well as explaining it orally or in writing. Use vocabulary flashcards and prompts. ➤ Use real objects where possible as a starting point for developing the concepts and the language needed to describe, discuss and explain what pupils have observed or experienced. ➤ Give children time to process and formulate their answers to questions before responding.

Physical and Sensory

Barriers	Provision
Difficulties impacting eyesight, hearing, movement, touch etc. Sensory processing difficulties.	<ul style="list-style-type: none"> ➤ Check safety procedures are understood. ➤ Label new equipment and processes to help develop vocabulary. ➤ Colour water so it is easier to see. ➤ Consider ventilation and positioning of children for anything that may have an odour. ➤ Pre-teach showing/experiencing anything that may have sensory implications -eg videos of heart, handling different materials. ➤ Consider children hard of hearing when teaching sound – follow guidance to develop children's understanding of how sound travels. ➤ Use of sensory aids as part of usual provision eg gloves, audio/visual support. ➤ Consider pupil sensory audits and adaptations. ➤ Use of standing desks, wobble boards, flexibility over where children write, thera-bands, writing slopes

Social, Emotional and Mental Health

Barriers	Provision
Anxiety Participation/ safety/ practical work	<ul style="list-style-type: none"> ➤ Consistency of approach reduces children's anxiety - it allows children to predict what will happen. ➤ Provide an overview of the lesson elements so the children know what is coming. ➤ Pre-teach the child some of the elements of the lesson etc. ➤ Consider carefully the groupings – prepare the children by ensuring they are aware of the group they will be working in. Assign roles to each member of the group with a clear outline of job roles. ➤ Specifically teach the skills of cooperation and interaction for practical work.

	<ul style="list-style-type: none"> ➤ When organising a practical session consider: - how you establish investigation routines - the level of supervision needed - consider the resources available – does there need to be close supervision? Do some resources need limiting? - how will resources be organised in the classroom – from a central point or at the table? - how the task can be broken down into manageable steps and the best way to present any instructions e.g. some children prefer diagrams, others a checklist. ➤ Opportunities to develop social skills including being taught these discretely to support engagement in group work and collaborative learning. ➤ Use of PSHE to discuss healthy relationships, promote wellbeing and explore emotive topics within learning.
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Further information can be found in our statement of equality information and objectives, and in our SEN policy and information report.

11. Health and Safety

Children at St. Paul's are taught how to use equipment safely and handle things with respect. They are taught how to use materials economically and to clean up after themselves with regard to the needs of other people.

12. Links to other policies

This subject policy links to the following policies and procedures:

- Curriculum policy
- Assessment policy
- Marking policy
- SEN policy

13. Monitoring and review

This policy will be reviewed by staff and governors annually.