

Science Vision and Policy

Holy Trinity C of E Primary School

The **vision** of Science at Holy Trinity is one that **values**:

- A **positive attitude** towards Science and an awareness of its **fascination**;
- Children developing an understanding of the nature, processes and methods of Science through a process of **enquiry** and **investigation**, and be able to form and develop scientific **explanations**;
- Developing a scientific and **conceptual understanding** through the specific disciplines of biology, chemistry and physics;
- Children have the **confidence** and **competence** when articulating scientific knowledge, concepts and skills;
- Effective **Scientific communication** and use of **Scientific vocabulary** across the **whole school community**;
- Children developing an ability to reason, predict, think logically and to work systematically and accurately;
- Instilling the initiative to work both **independently** and in **co-operation** with others;
- To understand the use of Science, today and for the future, in the **wider world**.

To work towards this vision and ensure a consistent approach to high provision of Science throughout the school we aim:

- To keep up to date with new **government policies** and **high-quality, evidence-based research** and adapt our curriculum where appropriate;
- **Continuously adapt** to the **changing needs** of children at Holy Trinity School;
- Develop a **growth mindset** about ability to learn Science;
- To instil **confidence** and **enjoyment** through the development of an **'I can do' culture**;
- To provide **dual objective challenges** to teach content and working scientifically skills simultaneously;
- To tailor **personalised learning** to meet the needs of all children through rigorous **assessment for learning**;
- To provide **meaningful, experiential learning opportunities** to aid deep understanding of Scientific concepts and integrate and apply Scientific skills and knowledge within the framework of a **creative and skills-based curriculum**;
- To utilise **ICT purposefully** in the learning of Science;
- To provide a Science curriculum that challenges children **beyond National Curriculum** expectations, through tailored support and sharing research and evidence-based with STEM Learning Solutions science network group;
- The children at Holy Trinity will acquire appropriate skills, knowledge and understanding to be able to **explain science** and be able to **classify** within topics;
- The children at Holy Trinity will acquire appropriate skills, knowledge and understanding to be able to work scientifically: **Designing Experiments, Data, Tables and Graphs and Making Conclusions**;
- The children at Holy Trinity will acquire appropriate skills, knowledge and understanding of: **Electricity, Plants, Animals including Humans, Everyday Materials, Seasonal Changes, Living Things and Their Habitats, Rocks, Light, Forces and Magnets, States of Matter, Sound, Properties and Changes of Materials, Earth and Space and Evolution and Inheritance**.

Purpose of Study

Why Do We Teach Science?

A high quality Science education provides a foundation for understanding the world. Science has changed our lives and is vital to the world's future prosperity. Through building 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 key knowledge and concepts can be used to explain what is occurring, predict how things will behave, and analyse cause. This understanding should be consolidated through their appreciation of applications of Science in society and economy.

Conceptual and Procedural Understanding

Our high-quality science curriculum not only identifies the important concepts and procedures for pupils to learn, it also plans for how pupils will build knowledge of these over time through a logical sequence of knowledge, skills and concepts. As pupils progress through the science curriculum, new knowledge gets systematically integrated into pre-existing knowledge. This forms larger concepts and new concepts, which in turn allow pupils to operate at more abstract levels. Scientific enquiry integrates substantive and disciplinary knowledge into an overall strategy to answer questions about the material world. Once disciplinary knowledge is introduced, it is practised in different topics and disciplines. This allows pupils to learn how the same disciplinary knowledge is

used in different substantive contexts. Within substantive knowledge children learn about explaining science and classification. Within disciplinary knowledge pupils learn about designing experiments, data, tables and graphs and making conclusions which are broken down into year group objectives, meeting and extending the National Curriculum expectations.

Conceptual threads called ‘science models’ are taught within topics and provide a foundation for pupil descriptions and explanations, support scientific language development, develop ‘hands on’ learning and divergent thinking, engagement and a deeper understanding through a structured development of science ideas and concepts. There are four key science models in the primary curriculum: particle model, force arrow model, energy transfer model, big picture model. These models allow for deeper learning because the models thread through our science curriculum so pupils recognise concepts as they remember the model from previous topics; increasing familiarity through connected learning and decreasing abstract learning as children progress through each year group.

	Particle Model	Force Arrow Model	Energy Transfer Model	Big Picture Model
Plants				
Seasonal Changes				
Animals Including Humans				
Living Things and Their Habitats				
Evolution and Inheritance				
Materials				
Rocks				
States of Matter				
Electricity				
Light				
Earth and Space				
Sound				
Forces and Magnets				

Pupils should be able to describe associated processes and key characteristics in common language, but they should also be familiar with, and use, scientific terminology accurately and precisely. They should build up an extended scientific vocabulary. They should also apply their mathematical knowledge to their understanding of Science, including collecting, presenting and analysing data. As children progress through school, enquiry-led approaches that are child-centred can be completed because the children have been taught the skills prior to completing enquiry independently. Within working scientifically, the children are taught four content areas:

- **Science knowledge of methods that scientists use to answer questions** – the use of models, classification, description, pattern spotting in establishing scientific knowledge.
- **Knowledge of apparatus and techniques, including measurement** – pupils carry out procedures and protocols safely in class and outdoor environments, accurately measure and recording of data and learn how to reduce errors.
- **Knowledge of data analysis** – pupils learn how to process and present scientific data in a variety of ways to explore relationships and communicate results to others. Pupils learn different types of tables and graphs and how to identify correlations.
- **Knowledge of how science uses evidence to develop explanations** – pupils learn how evidence is used alongside substantive knowledge to draw tentative but valid conclusions. They consider the distinction between correlation and causation, knowing that explanation is distinct from data. Pupils learn how models, laws and theories develop over time and reflect upon the importance of technology.
- **Sustainability** – pupils explore scientific questions around sustainability and the planet, this helps pupils develop an empathy for the local and wider environment.

Role of the Subject Leader

To ensure that all members of the school community understand the vision of Science at Holy Trinity and to lead, challenge and support all in achieving the vision by:

- Ensuring curriculum policies, guidelines and resources are well organised, reviewed, updated and easily accessible;
- Maintaining clarity of expectations in relation to each year group's allocated learning outcomes, planning, assessment and teaching and learning strategies, including vocabulary;
- Developing standards in teaching and learning by attending CPD and sharing best practice;
- Monitoring, evaluating and developing standards in teaching and learning;
- Monitoring and evaluating WOW trip experiences which have been used as a science 'hook';
- Identifying and addressing strengths and areas for development through termly book scrutinies, learning walks and pupil voice;
- Informing, supporting and providing development opportunities for all.

Achieving the Science Vision

Teaching and Learning

Scheme of work - We are following the White Rose Science scheme of work. White Rose Science teaches practical approaches to science and scientific language in a fun and logical way. At the same time, it provides teachers with all the guidance and supporting materials they need to plan and deliver a high quality science education. The schemes of learning provide full coverage of the national curriculum for science. They also cover scientific questions around sustainability and the planet, and help children develop an empathy for the local and wider environment.

Planning – We use the small steps approach. We break down the essential aspects of key stage science into easily digestible chunks. Through experiments, practice and discussion, children gain core knowledge around:

- ✓ Scientific vocabulary
- ✓ 'Working scientifically' skills including systematic and careful observations and following practical scientific methods
- ✓ The gathering and interpretation of straightforward scientific evidence
- ✓ The use of everyday materials and scientific equipment to solve science problems
- ✓ Articulating scientific concepts and using five types of science enquiries

We believe that children should be taught science in a way that helps nurture an understanding of the value of scientific skills. We think science learning should be engaging and inspiring.

Planned blocks of teaching are based on the specific needs of cohorts, groups and individual children and are identified through ongoing monitoring, marking and feedback; informing next steps. Dedicated Science lessons are flexible to allow meaningful, experiential learning opportunities and the ability to develop and apply scientific skills in other areas of the curriculum.

Assessment - The Assessment Board developed by STEM Learning Solutions is used to support planning and allow for fluidity between year-group related expectations. This document is used throughout the teaching of Science and is written for the use of all members of the school community. Staff record end of block assessment, which staff further through school can access. E.g. When a Year 4 teacher has a cohort and is teaching 'Materials', they can look back at when they covered materials previously and pick up the pupil's strengths and areas needing further support. Thus ensuring learning is revisited and built upon successfully.

CPD opportunities – White Rose offer comprehensive training courses to support the implementation of White Rose Science and provide teachers with the skills to deliver confidently. The subject leader will also identify areas staff feel they would benefit from further support and put this in place.

Within a planned Science lesson:

- Previous knowledge, understanding and skills are revisited to ensure a smooth transition into the new understanding;
- Challenge, independence, experiential learning and relating Science to the wider world are what drives planned sessions;
- Lessons are practical with children playing an active part in their learning, working independently, in pairs or groups and engaging in constant dialogue with others;
- Outdoor learning opportunities are taken where possible;
- A combination of teaching styles is adopted to suit the needs of all learners, with high expectations for all;
- Key vocabulary, learning outcomes, success criteria and targets are shared with the children at the outset;
- Differentiation is evident, effective and support is precisely targeted;
- Incidental or planned intervention groups, with staff or the use of technology, are in place to support children's specific needs;
- Teachers and teaching assistants (where available) work with specific focus groups, and actively intervene and support with the learning of particular children by using effective questioning to challenge or extend children's thought processes.

The National Curriculum for Science is used as a framework for science content, skills and pupil expectations at our school. The programmes of study for Science are set out year-by-year for Key Stages 1 and 2. We are required to teach the relevant programme of study by the end of the key stage. Within each key stage, we have the flexibility to introduce content earlier or later than set out in the programme of study and may introduce key stage content during an earlier key stage if appropriate.

Curriculum mapping provides a guide to how the White Rose Science curriculum links to the Key Stage 1 and 2 national curriculum, and how it progresses through topics. For each of the major topic areas, you can then see which National Curriculum objectives are covered in that year, together with the term and block in which that objective is first met in version 1 of the White Rose Science schemes. In addition, we have looked at how disciplinary knowledge (titled working scientifically in the NC) progresses from Year 1 to Year 6. The working scientifically skills have been broken down into eight key areas:

- ✓ Ask questions
- ✓ Plan
- ✓ Make observations
- ✓ Take measurements
- ✓ Gather, record and classify data
- ✓ Present findings
- ✓ Answer questions and make conclusions
- ✓ Evaluate (KS2 only)

Early Years

In the Foundation Stage teachers follow a curriculum that is planned in line with the new statutory framework for the early year's foundation stage (2021) and Development Matters (2021) and aim for children to achieve the ELGs. The Early Years Science curriculum provides all children with the appropriate skills, knowledge and understanding of: **Senses and Materials, Light, Magnets, Growth and Change, Living Things and Being Healthy**. These topics are linked to the overarching topic of that half term for Reception and Nursery to allow children to make connections to the wider world.

Across EYFS, KS1 and KS2, WOW activities and hooks are used at selected points within topics to improve science capital, provide real life experiences, increase engagement and curiosity as well as reducing the abstractness related to particular topics and vocabulary. Some year groups, when appropriate, work collaboratively to enhance their learning experiences. Hooks could include interviews, videos, books, images, a display of scientific phenomena, trips and key speakers.

Within Early Years, the Science curriculum is enhanced through each classroom having a designated investigation area. This area is updated half-termly and links to the topic for that half term. Children are introduced to scientific vocabulary at the start of each new topic which is further embedded through given opportunities to explore in the investigation area. Such scientific vocabulary is further enhanced through effective modelling from adults and asking children questions. Working scientifically, within the early

years, is achieved through children making their own observations, asking simple questions and conducting group investigations e.g. if an object will float or sink.

Assessment

Teacher assessment is achieved through:

- Discussion with pupils and their ability to answer closed and open-ended questions;
- Observation of pupils engaged in an activity;
- Marking ongoing written work, giving instant feedback, speech bubbles to discuss an aspect of a child's work and Qs to consolidate or extend learning;
- Dialogue with members of support staff;
- Evaluations from planning documents;
- End of block assessments and review lessons.

Tracking progress

Pupil progress is monitored using teacher assessment against five key areas: explaining Science, classification, designing experiments, data, tables and graphs and making conclusions. This may be evident in pupils' written work, feedback or through teacher observations within lessons. An end of year comment is written against national expectations and is shared with parents on end of year reports. The report also includes an individual target.

Marking

Teachers mark pupils' work following the school marking policy. Pupils are given appropriate time to respond to misconceptions and errors. Teachers may also ask pupils to look back over work with them to address misconception or to look at scientific vocabulary.

Resources

- Science resources are stored in a central location.
- Staff share the responsibility of ensuring that resources are well kept and replenished.
- Individual class teachers are responsible for requesting specific resources for individual topics before the start of each term.

Health and Safety

- Emphasis is given at all times to safe working procedures for staff and pupils.
- A copy of the COSHH guidance 'Be Safe' is centrally located in the staffroom.
- CLEAPSS safety guidance in relation to COVID has been shared with staff.

Cross-Curricular Links

Within Science, other curriculum skills are present including Maths (such as data, tables and graphs) and writing (such as basic grammar and punctuation is reinforced, spelling of scientific vocabulary, organising work using headings, explanation texts). Science is also present in other curriculum lessons. For example, some teachers might use novels with a Science genre and writing from this would then include reinforced scientific vocabulary and concepts, in PE teachers reinforce healthy living, in UKS2 children discuss the role of Science and God in the story of Creation, children may complete research linked to scientific concepts, scientists or inventors by using computing research skills, and natural phenomena may be a stimulus for Art and Design or Design and Technology.

Academy Councillor

There is a named governor linked to Science who plays a key role in monitoring and evaluating Science across the whole school through discussions each term with the subject leader.

Last reviewed: September 2024

Next review date: September 2025

Subject Lead: Miss L Martin

Link Governor: Mr M Johnson

