



Hawes Primary School ~ Science Rationale



"Millions saw the apple fall, but Newton asked why." - Bernard Baruch

"The important thing is to never stop questioning." - Albert Einstein

Science is a means of discovering and understanding the world around us. It consists of a body of knowledge which attempts to explain phenomena and experiences. It also involves both curiosity, trial and error and a number of skills and processes by which this knowledge is achieved and applied. Science forms an integral part of our everyday life. It is therefore important for all children to be scientifically literate and show positive attitudes towards it and its applications.

We aim to help all children to develop an understanding and appreciation of the substantive and disciplinary knowledge in science; providing pupils with a broad and balanced curriculum, using practical work where possible to teach concepts and to develop the skills of scientific enquiry: observation, classification, hypothesising, data collection, interpretation of data and evaluation; which will prepare them for the next phase in their education.

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)

Our Teaching of Science will ensure pupils:

- Experience scientific phenomena e.g. real world sensory interactions
- Be engaged and motivated e.g. children being interested in learning and doing science
- Lead their own learning e.g. children asking their own questions and making decisions
- Develop understanding of the scientific method e.g. plan, do, review
- Develop scientific skills e.g. observe, gather and measure data using equipment
- Developing understanding of what it means to do science and be a scientist
- Learn and use scientific vocabulary
- Developing conceptual understanding e.g. learn, deepen and apply scientific knowledge
- Develop personal and social skills e.g. oracy, collaboration, perseverance
- Relate science learning to their own world and cross-curricula context

The Curriculum:

At Hawes Primary School, we believe that **all** children's education begins in Early Years (this includes SEND, EAL, PP and vulnerable children). 'Children develop quickly in the early years and a child's experiences between birth and age five have a major impact on their future life chances.' (*EYFS Statutory Framework, 2021*)

Our curriculum is aligned to the Early Years Framework and shows the sequential steps of essential knowledge acquired from Reception to Year 6. We have a determined approach that drives us to ensure that all children meet the expected standard in science and have the knowledge required for secondary school. **Our intent is that all children know more, remember more and do more.**

The whole school long term plan is designed to be used for mixed age classes. To ensure firm foundations of knowledge, children in KS1 are taught the same topic over a 2 year cycle, deepening their knowledge from Year 1 in Year 2 ready to access the KS2 curriculum which is taught across a 2 year program. KS2 is split into Year A and Year B so children acquire all the essential knowledge required by the end of KS2. Science at Hawes Primary is taught weekly.

Where appropriate, natural links will be made with other areas of the curriculum and the associated unit of knowledge will be taught prior to this. For example, in UKS2, the unit of animals including humans in Year 5 will be taught before the PSHE unit Growing, developing and relationships and before the SRE content for Year 6. This provides the opportunity to deliberately practise the knowledge acquired.

- At Hawes, we have designed a high-quality curriculum that has a clear sequence of learning and is founded in metacognitive research and research into best practice in Primary Science.
- The Curriculum is designed through carefully planned units of work that build on prior knowledge in order to construct a good understanding of new substantive knowledge.
- Planning allows children to become fluent in their knowledge by allowing sufficient time to immerse themselves with the new learning as well as using knowledge recalls provided throughout the year to aid knowledge to be embedded into their long-term memory.
- Prior, connected knowledge, is recalled before introducing new ideas, and misconceptions are actively diagnosed and discussed.
- Teachers plan lessons to deepen children's knowledge further and allow sufficient time to fully investigate topics before moving on to new learning.
- Drawing on research, teaching takes a practical approach where possible to demonstrate concepts and to support scientific enquiry skills.
- Teachers planning includes and show a substantive and disciplinary approach to science. This therefore allows children the increasing opportunity to apply knowledge in an appropriate ways.
- Learning experiences should arouse curiosity about natural phenomena which stimulates the posing of questions about such phenomena and enable children to ask and attempt to answer questions arising from observations.

Knowledge in science:

Knowledge refers to the theories and concepts making up science, the method of posing questions and carrying out investigations. Although there is no fixed way in which scientists work, all investigations tend to have aspects of common processes such as observation, classification, hypothesising, data collection, interpretation of data and evaluation.

Substantive Knowledge: Knowledge refers to the theories and concepts making up science, the method of posing questions and carrying out investigations. Although there is no fixed way in which scientists work, all investigations tend to have aspects of common processes such as observation, classification, hypothesising, data collection, interpretation of data and evaluation.

Disciplinary knowledge: In science, disciplinary knowledge is how science is collected, investigated, understood and evaluated. This is the scientific method i.e. changing one variable in an experiment to keep the process a fair test. Within disciplinary knowledge, children can make predictions and observations, record measurements, gather and analyse data as well as carrying out and communicating their investigations.

Connecting knowledge

New knowledge should be integrated with existing connected knowledge. The relationship between scientific concepts should be taught 'over multiple years, without working memory being overloaded' thus building on existing knowledge whilst revisiting connected knowledge.

Deliberate practise ensures that learned knowledge is accessible and not forgotten. The ultimate goal is an alteration in the pupils' long term memory enabling them to know more, remember more and therefore do more.

Connections between different subject areas (particularly maths) must also be identified in lessons so that pupils can be taught how to transfer mathematical knowledge in to a scientific context.

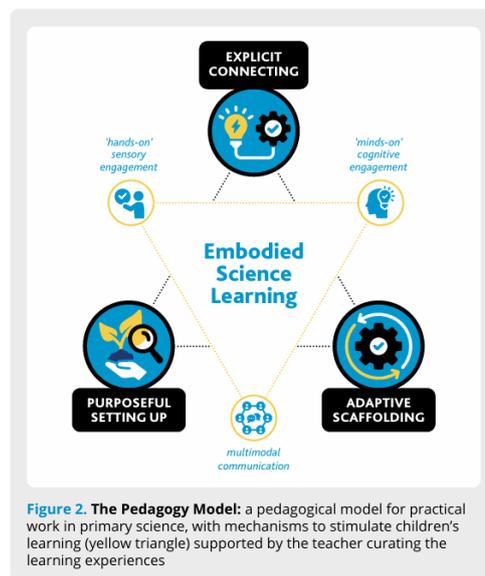
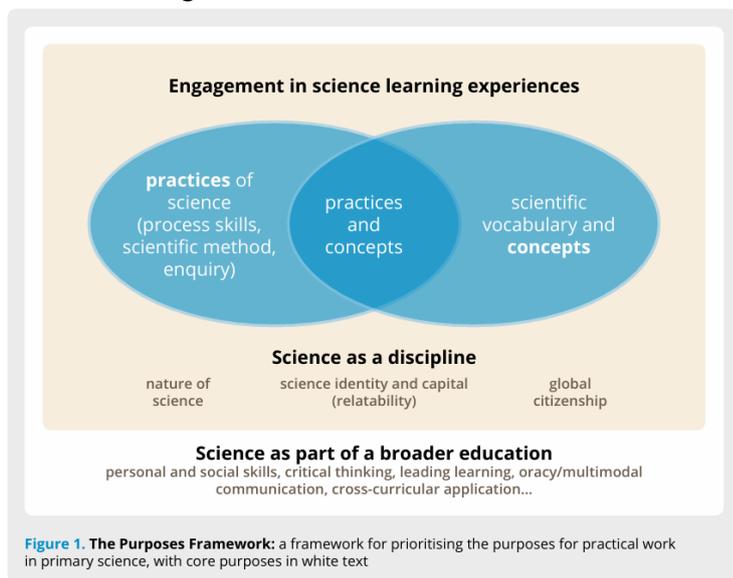
Pupils will develop both their substantive and disciplinary knowledge learning about:

- The natural world, living things and animals, including humans
- The human body, some of the processes it uses to survive and how to keep it healthy
- Materials, their properties and how these help scientists make decisions as to their practicality and uses
- States of Matter and the forces that impact our daily lives
- Geology: How the Earth was formed and what rocks and soils are made from
- Earth and Space
- Investigative skills, enabling them to systematically ask and attempt to answer questions arising from observations
- Scientists who have contributed to the field of science
- Scientific vocabulary

Practical work

Definition of practical work in primary science: Children observe, manipulate, communicate and connect their science thinking through sensory learning experiences with physical objects and phenomena. – *Purposeful Practical Work in Primary Science*.

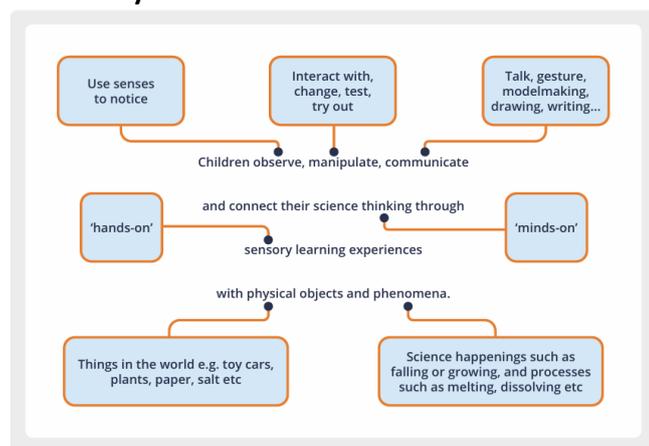
We use the Purposes Framework and the Pedagogy model when planning to ensure purposeful practical work. Not all practical work in enquiry based. It may be used to teach a concept using real life observations and experiences to deepen understanding.



The Purposes Framework supports teachers to identify why practical work would be undertaken.

1. Practical work engages children, supporting their interest and attention within the lesson.
2. Practical work addresses one or both of two core purposes for children's learning in science:
 - i. developing the children's science practices e.g. measuring skills, understanding of different approaches to enquiry and the scientific method for planning, doing or reviewing,
 - ii. developing the concepts of science, e.g. vocabulary, scientific ideas or content of biology, chemistry or physics.
3. Practical work supports a longer-term aim of helping children to understand science as a discipline, recognising how science is related to their lives and how important it is to them as global citizens.
4. The Framework acknowledges science as a part of a broader education entitlement, where practical work contributes to children's development of social skills and cross-curricular learning

Vocabulary



Scientific vocabulary is complex and within units children are exposed to many Tier 3 words.

Vocabulary is built sequentially across age phases and year groups. This includes more generic terms and also unit specific terms. New vocabulary is introduced, taught, modelled and practiced throughout the unit and recalled in Knowledge Checks.

Assessment

Hawes Primary School, children's prior knowledge and any misconceptions that they may have are assessed through a variety of methods such as low stakes quizzes. Units of work are then personalised to the needs of the groups of learners.

Summative assessments take place at the end of the topic with two further recalls taking place approximately six weeks and then twelve weeks later to embed knowledge in long-term memory. Identified children receive catch up support to ensure they understand key learning concepts.

Reading opportunities in science

Reading underpins our entire curriculum. Key texts and pieces of information are carefully selected ensuring that the content and reading age are appropriate. Key texts are on display and made available for the children to access during daily 'reading for pleasure' time.

Enhancements in science

At Hawes Primary School, we ensure that all year groups are exposed to a wide range of opportunities that enhance children's knowledge and cultural capital in all subjects. Science visits and visitors enables the children to gain hands-on-practical experiences that may not be possible in the constraints of a classroom. They enable children to apply their knowledge and be taught by 'experts' in the field. When choosing visitors, dispelling gender stereotypes in science and technology is key.

As a member of the Settlebeck School **Ogden Trust Partnership**, we access high quality CPD and resources, all designed and led by experts in physics to ensure teaching is of the highest quality, investigation led and adheres to the latest research. The partnership also provides opportunities for children to visit the high school for enrichment opportunities around science.

SMSC in Science

Science lessons offer a wealth of opportunities for promoting Social, Moral, Spiritual and Cultural (SMSC) development in students. By incorporating SMSC into science lessons, teachers can help to create a positive and engaging learning environment that supports the personal development of their students and helps to prepare them for the challenges of the future and to promote social cohesion and understanding in their communities.

Understanding Ethics: Science often involves ethical considerations. Teachers can encourage students to consider these issues at an age appropriate level and to think about their own values and beliefs.

Exploring Culture and Diversity: Science is a global subject that is practised by people of all cultures and backgrounds. Teachers can use science lessons to celebrate diversity and to encourage students to learn about different cultures and beliefs.

Building Social Skills: Science lessons often involve group work and collaboration, providing opportunities for students to develop social skills and to work together to find solutions to problems thus building trust and respect and promoting social cohesion.

Promoting Spiritual Awareness: Science has the potential to evoke a sense of awe and wonder in students, helping them to appreciate the beauty and complexity of the natural world. Children can reflect on their own spirituality and to think about the role that science plays in their lives.

Encouraging Personal Development: Science lessons provide opportunities for students to develop their critical thinking skills, to solve problems, and to reflect on their own learning, fostering personal development.

This document is set in the context of our Hawes Primary School "Whole Curriculum Intent Overview Statement and Curriculum Policy." These documents include the EYFS Framework 2021 and National Curriculum (2013 & updates) statutory requirements. They also refer to the Nuffield Trust Purposeful Practical Work in Primary Science document published in 2025

To Be Reviewed: September 2027