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 a number of skills and processes by which this knowledge is achieved and applied. Science is also concerned with the development of attitudes concerning scientific activity. Science forms an integral part of our everyday life. It is therefore important for all children to be scientifically literate.

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 and teaching them 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:

- learn about the world and gain knowledge
- are curious about natural phenomena and advances in technology
- investigate problems
- learn how science works
- discover why science matters in the world and appreciate the importance of science in everyday life and its influence on society

It will also help them to:

- challenge the perception that science can provide absolute truth and provide a solution to all problems and develop a positive critical attitude towards scientific developments
- appreciate the scientific process and see that everyone benefits from the positive results of science
- be ready to engage in science and scientific methodology

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.**

Why this, why now?

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 in 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 based on metacognitive research that has a clear sequence of learning.
- 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 knowledge is recalled before introducing new ideas, and misconceptions 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.
- 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

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.

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.

Reviewed: September 2024

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