



Science



Intent

The Science curriculum at Hunningley Primary Academy provides children with coherent, substantive knowledge of the scientific disciplines of biology, chemistry, and physics. Beginning first with the National Curriculum, we have designed our curriculum as a progressive model around vertical concepts based upon the 'Big Ideas of Science' which provide a concrete lens through which to study and contextualise science and provide firm foundations for KS3 and KS4.

It also intends to embed core disciplinary knowledge, and the ability to systematically approach challenging, scientifically valid questions through:

-Scientific Attitudes & Planning

asking scientifically relevant scientific questions and designing controlled investigations.

-Measuring & Observing

learning how to use scientific apparatus like rulers and thermometers, and making systematic observations.

-Recording & Presenting

setting up data collection tables and presenting this data in a variety of charts and graphs.

-Analysing & Evaluating

interpreting and analysing findings; drawing conclusions and evaluating the reliability of investigations.

It equips children with sufficient knowledge to be procedurally fluent scientists and for them to think, communicate and work like a professional scientist. Staff are highly trained in co-operative learning structures which actively engage pupils in structured talk, helping them articulate scientific ideas, reason verbally, and build confidence in using scientific vocabulary. These collaborative strategies promote dialogic learning, where children learn through speaking and listening, thereby strengthening their oracy skills in a purposeful, curriculum-linked context. Our curriculum is designed in way which creates awe and wonder about science, that inspires a curiosity about natural phenomena and the world around them. It ensures that all pupils can see themselves reflected in the science curriculum, by highlighting present-day role models and the contributions of scientists from a wide range of backgrounds; and considering social and cultural values around scientific ideas. In addition to classroom-based learning, we incorporate Forest School and outdoor learning experiences to deepen pupils' understanding of scientific concepts in real-world contexts. Outdoor educational can significantly enhance students' cognitive skills and long-term memory retention. These experiences help children make deeper connections with curriculum content by engaging multiple senses and providing real-world context. It is especially beneficial for disadvantaged pupils, helping to build cultural capital and close learning gaps through hands-on, inclusive experiences

Implementation

Early Years is the first opportunity to develop our children's curiosity for Science. We implement our science curriculum by following the interests of the children through the Early Years Foundation Stage Statutory Framework which aims to guide children to make sense of the natural world around them. Through continuous provision children are able to explore their scientific interests through regularly updates science investigation areas and through well planned challenges and provocations. Staff engage in high-quality interactions to develop vocabulary and knowledge

helping children articulate what they know through modelling and extending their scientific knowledge and ideas.

In Key Stages 1 and 2 substantive knowledge ensures pupils master core content through the development of key concepts and timely revisiting of key knowledge. Teaching is highly responsive, underpinned by a systematic approach to pre-learning quizzes and retrieval practice. This enables teachers to swiftly identify gaps in pupils' knowledge and skills, allowing for targeted planning that effectively addresses misconceptions and closes gaps with precision and pace. The careful planning and delivery of the curriculum prevents common misconceptions that are often formed at an early age and prove problematic at the later stages of pupils' science education from occurring. Pupils apply and make connections between the disciplines of science, the wider curriculum, and the wider world.

Disciplinary knowledge (working scientifically) is sequenced so that they are explicitly taught and practiced alongside the substantive knowledge, and regularly reviewed and built upon across the years and key stages. At Hunningley we make deliberate and explicit links to other curriculum areas – particularly geography and mathematics – to ensure there is a consistent approach to teaching content, and that pupils are always first taught content in the most relevant subject. For example, pupils are taught how to construct bar charts or calculate the mean in mathematics before they are applied in science. We plan practical tasks that have a clear purpose: to demonstrate or prove substantive concepts, or to allow pupils to deliberately practice working scientifically skills in a relevant context.

When teachers plan a unit, they begin with the end in mind, having clarity about exactly what they want the children to learn. Outcomes are clear and detailed, and each lesson has a concise learning intention. We are determined that children develop the progressive skills of a scientist throughout their time at Hunningley and not just learn a series scientific facts. Substantive knowledge rich lessons where children build on prior learning and situate knowledge within carefully constructed concepts are delivered following Rosenshine's Principles of Instruction. Teachers create knowledge organisers which outline the key substantive knowledge and vocabulary which all children must master with each unit being carefully planned for progression and depth. The curriculum is well designed and developed to be ambitious for all learners and to ensure children know more and can remember more. Based upon up-to-date research on cognitive load and on how children learn most effectively, determined our approach to implementing our science curriculum. We take an approach of spacing out new knowledge combined with interleaving and retrieval practice to ensure learning sticks. Each unit has built in practice, retrieval, and reinforcement of the key vertical concepts to ensure knowledge sticks in the long-term memory. For learning to stick in the long-term memory we teach scientific knowledge in meaningful contexts and in a connected way.

Outdoor learning sessions allow children to explore classification of living things through direct observation of flora and fauna, investigate seasonal changes by tracking environmental patterns, and experiment with filtration systems using natural materials to understand separation techniques. Activities such as building and testing parachutes or wind catchers outdoors help pupils explore air resistance and forces in action. These experiences foster curiosity, support long-term retention, and reflect up to date research on the value of outdoor learning in embedding curriculum knowledge and promoting engagement.

For each unit of learning, teachers plan for and children experience:

- The disciplinary knowledge needed to be successful scientists
- Co-operative learning using Kagan strategies to ensure high levels of accountability and engagement for all children.

- A careers pathway that highlights the range of jobs and careers that learning in science can lead to.
- Educational visits, visiting experts and artifacts to enhance the learning experience.
- Classroom working walls which detail; current, prior and future learning, the substantive and disciplinary knowledge children will learn, dual coded key vocabulary, the vertical concept the area of learning falls within and links where applicable, to our sustainability curriculum.
- To bring learning to life, lessons or parts of lessons take place in our immersive classroom to enable children to see first-hand the curriculum they are learning at that time in their own school environment.
- Questioning is used to allow pupils to consolidate knowledge and understanding where necessary or to apply learning in an open manner.
- Opportunities for all pupils to see themselves reflected in the curriculum by exploring present-day role models and the contributions of scientists from a wide range of backgrounds; and considering social and cultural values around scientific ideas.
- To enable children of all abilities to access the curriculum, additional models and scaffolds are provided. Teachers reference the 'Science Four Broad Areas of Need document' to ensure their planning meets the needs of all children; changes to pedagogy are also considered and changes to content are made in consultation with the Science Lead and the SENCO.
- Teachers receive termly professional development to enable them to deliver the curriculum effectively.

Impact

Our Science Curriculum is high quality, well sequenced and planned to demonstrate progression. Children will become increasingly critical and analytical in their thinking being able to form their own theories and hypotheses based on key scientific concepts. They will become increasingly aware of the role science plays in our everyday lives and the world around and the part they play in the preservation of our natural world. Children will develop a passion for science and an enthusiastic engagement in learning, which develops their sense of curiosity in the fields of chemistry, physics, and biology.

Our curriculum is designed in a way to be suitably challenging; we believe that if children are keeping up with the demands of each lesson, that they are making good or better progress.

In addition to this, we measure the impact of our curriculum through the following methods:

- A pre learning quiz to ascertain whether children have mastered the prior learning needed to enable them to access the planned unit. This takes place two weeks prior to the start of new learning to provide time for any prior learning gaps to be addressed. This seen in pupil books within a yellow border.
- A reflection on standards achieved against the planned outcomes.
- Low stakes quizzes.
- Pupil's books and pupil discussions about their learning.
- Scholarly writing opportunities are planned to provide children with the opportunity to write at length to demonstrate their knowledge gained at the end of the learning sequence.
- Teachers constantly interact with children assessing their thinking, knowledge, and understanding. Feedback is actionable, precise, and acted on by the children in every lesson.
- Teachers review learning during learning, spaced after the unit has been taught, and after protracted periods of time. Recall and retrieval practice demonstrates whether learning has been remembered.

- Outdoor learning that contributes to pupils' cultural capital by providing enriching experiences, especially for disadvantaged learners, and supports the development of scientific thinking, independence, and environmental responsibility.

This carefully structured approach to science teaching ensures that all pupils including disadvantaged pupils, those with SEND, and children known to social care are fully included, supported, and inspired. By embedding cooperative learning, immersive experiences, and tailored scaffolding, all children are given equitable access to high-quality scientific education. The use of working walls, retrieval practice, and career-linked content helps build cultural capital, close attainment gaps, and raise aspirations. Exposure to diverse role models and real-world applications empowers pupils to see themselves as future scientists, fostering ambition and broadening their understanding of the opportunities science can offer in later life.