Bilton Grange Primary School
Science Rationale

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

Science has changed our lives and is vital to the world's future sustainability and prosperity. Science explains the mechanics and reasoning behind the daily function of complex systems, including the human body.

At Bilton Grange our Science curriculum teaches children essential aspects of the knowledge, methods, processes and uses of science. Through carefully planned, challenging lessons and high quality teaching we enable the children to build up a body of key foundational knowledge and concepts. They are encouraged to develop a sense of excitement and curiosity about natural phenomena and recognise the power of rational explanation. The children are encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes. Children can discover, explain and develop skills of enquiry through working scientifically.

Primary Science helps children to:

- Observe, explore and ask questions about living things, materials and phenomena.
- Work together to collect evidence to help answer questions and link this to scientific ideas and theories.
- Evaluate evidence and consider whether tests or comparisons are fair.
- Use reference materials to find out more about scientific ideas.
- Share their ideas and communicate them using scientific language, drawings, charts and tables.

The national curriculum for science aims to ensure that all pupils:

- 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
- are equipped with the scientific knowledge required to understand **the uses and implications** of science, today and for the future

"Equipped with his five senses,
man explores the universe around him and calls the adventure Science"
Edwin Hubble

We have a cross curricular themed approach that is knowledge rich, carefully building upon the children's previous knowledge with small sequential steps. Our approach is underpinned by the four curriculum drivers that are at the heart of everything we do.

- Collaboration
- Communication
- Creative Arts
- Community

British Values and Cultural Capital
A balance of activities will be provided to help support the learning of fundamental British values. These also support the provision for personal development and enhance children's cultural capital within the subject.

Spiritual, Moral, Social and Cultural
Contributions to Spiritual, Moral, Social and Cultural development occur as children learn about themselves and the variation amongst individuals. They learn about health and hygiene and begin to learn about life cycles. Science provides opportunities to develop informed attitudes to many topical issues. By doing so, children can begin to develop mature, responsible opinions and values. In science, opportunities are taken to discuss aspects of environmental awareness with the aim of developing responsible attitudes to waste disposal, resource depletion, wildlife conservation.

Knowledge and Enquiry in Science

Knowledge

In Science this refers to

- A knowledge and understanding of key concepts taught within different topics/units
- A knowledge of practical skills needed to carry out investigations.
- A knowledge of scientific vocabulary.
- A knowledge of how ideas can be linked across the wider curriculum.

Substantive Knowledge
This is the acquisition of knowledge and the understanding of key concepts along with the development of practical skills that are needed when investigating the world around them. It is progressive from EY to Year 6, and builds on prior knowledge and skills. Children will also be taught scientific vocabulary and language and use 'learning sentences' to embed new concepts. This is also progressive from EY to Year 6.

Disciplinary Knowledge.
This is the application of substantive knowledge and skills along with the interpretation of some of the key concepts across the wider curriculum. Children are encouraged to have the confidence to identify links, reason and argue and apply their knowledge and skills. Disciplinary knowledge is developed and embedded through working scientifically.

Enquiry
As the children build on their substantive and disciplinary knowledge within scientific contexts, they will have continuous opportunities for scientific enquiry. 'Working scientifically' is an important part of the curriculum and is carefully planned into blocks of lessons. All children are encouraged to question, think critically and evaluate evidence at an age appropriate level. Examples of this might be investigating ice melting in the EY to planning and carrying out an investigation about the solubility of salt inY6.

Intent

At Bilton Grange we believe that our children should learn about science in a way that engages them and makes them curious and want to find out more. Through a thematic approach it helps us to make cross curricular links with others subjects and deepen their understanding.

We follow the national curriculum and have sequenced the curriculum to enable pupils to build their knowledge and skills over time. We ensure that this content is taught in a logical progression, systematically and explicitly enough for all pupils to acquire the intended knowledge and skills. The curriculum is designed and taught so that pupils read at an age-appropriate level. We believe children should learn about science in a way that is exciting, that fosters curiosity and that is practical where possible. We want children to observe closely, question, challenge and evaluate. By the time children leave Year 6, we want them to have strong desire to find out more about our amazing world. More specifically we want children to have a coherent understanding of key scientific concepts; skills to be able to investigate those concepts and finally, the ability to use age-appropriate scientific vocabulary.

Implementation

To help embed the different aspects of 'Working scientifically' and teach the key skills the children need to learn, we use our Superhero characters. These are

- Spy Magnus - Observing over time
- Supergirl - Comparative and fair testing
- Commander Classify- Identifying, classifying and grouping
- Captain Peeko - Pattern seeking
- Billy Bookend - Researching using secondary sources

Early Years

- In EYs science is woven throughout the specific area of Understanding the World. The element of UW is planned using a medium-term planning template and a short-term provision plan. Across these documents the following aspects are identified:
    - Pre-learning discussions.
    - Details of the "wow" starter and learning "end point"
    - The learning sequence of lessons
    - Key vocabulary and questions.
    - Activities for each of the school's 4 C's drivers

Key Stage 1 and 2

- Within each key stage, units of work are planned using a medium-term planning template which identifies:
- Overlearning and pre-learning activities
- Details of the "wow" starter and learning "end point"
- Objectives to be taught – separated into substantive (red) and disciplinary (blue) content
- Key knowledge statements (remembering sentences) to be taught in the unit
- The learning sequence of lessons
- Key vocabulary to be taught - separated into horizontal and vertical vocabulary
- Activities for each of the school's 4 C's drivers
- Learning is planned sequentially to enable children to build upon prior learning and to acquire new knowledge over the duration of the unit.

- Lessons will be blocked to enable children to become fluent in their knowledge, allowing them time to immerse themselves in new learning.
- At the beginning of each unit of work, children will complete an over-learning recall activity to retrieve essential knowledge from the previous years topic. This should identify any gaps in knowledge, enabling the teacher to provide additional support for children who have gaps in their previously acquired essential knowledge.
- Children complete a pre-learning activity prior to the topic being taught. This identifies the essential knowledge children already know and enables teachers to provide additional support or challenge throughout the unit for individual children.
- The essential knowledge identified in each unit provides the basis of the knowledge sentences (remembering sentences) to be shared with children. These are chanted and referred to throughout each lesson, helping the children to store this knowledge in their long term memory.
- Essential knowledge and vocabulary should be displayed in the classroom and included on learning slips in children's books.
- To deepen understanding, disciplinary knowledge enables children to interpret and reason their substantive knowledge across a range of different contexts.
- Vocabulary is split into vertical and horizontal deepening. Vertical deepening enables children to learn new vocabulary within the unit, building upon previously learnt vocabulary each year. Horizontal deepening enables children to see how the vocabulary can be used in a range of different subjects and contexts.
- Within the school's 4 C's (Communication, Collaboration, Creativity, Community) a balance of activities are provided to help support the learning of fundamental British values. They also support the provision for personal development and in enhancing children's cultural capital within the subject.
- Following each unit of work, children complete the pre-learning activity containing the essential knowledge for the unit. This occurs 2 weeks, 6 weeks and 12 weeks after the unit has been completed. Recalls provide opportunities for children to recall previously learnt knowledge and for teachers to track their progress. During these sessions, any gaps in knowledge are discussed and children are supported in remembering. This is done in an appropriate, age-related way and work is then personalised to meet the needs of all groups of learners.
- We endeavour to enrich their time in school with memorable experiences where appropriate, providing opportunities that are normally out of reach.

Impact

- The pupils in Early Years reflect on their learning by looking through their Learning Journey's and through class discussions. The 3 R's (Recall, Remember and Reflect) support the children throughout the year to know more and remember more.
- Observations in Early Years support the termly assessment of pupils and end of year judgements in UW.
- The 2/6/12 week recalls support the assessment of children. Results are added to tracking grids which, over the year, help to support an end of year judgement in science.
- A subject monitoring week is conducted every year. This ensures that the subject leader has a clear understanding of the strengths and weaknesses of how science is being delivered throughout the school. This monitoring week includes:

    - Learning walks
    - Book scrutiny
    - Planning scrutiny
    - Data/ assessment scrutiny
    - Interviews with children
- From this, the strengths and AFI's for the subject are developed and communicated to all staff and governors. Any immediate actions will be put into place quickly. Medium/ long term actions will be added to the School Improvement Plan.
- Work moderation within the subject is completed once a year. Teachers have the opportunity to share examples of work and check the accuracy of their teacher assessment judgements.

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