Science Curriculum Rationale

At St Wilfrid's Primary School, children will explore the world around them that was created by God. Through the specific disciplines of physics, chemistry and biology, they will learn about how the physical and natural world works, what its components are and how the world got to be the way it is. Science education is essential to provide children with a broad understanding of the status and nature of scientific knowledge, how it is created and how dependable it is.

INTENT



National Curriculum

St Wilfrid's follows the National Curriculum programme



will be able to answer their own science questions enquiry. The end points for working scientifically, set is observation and exploration) and Y4 (scaffolded enquiry), are the stepping stones towards this goal.



Sequencing

Demographically, the people learning STEM subjects beyond 16 in the UK fall into the same gender, ethnic and social groups as they did 20 years ago, and yet there is a STEM skill gap in the country. St Wilfrid's uses the 'science capital' approach to try to address this inequality. We recognise that children come to us with different amounts of science capital (knowledge, attitudes, skills and experiences) and use enquiry-based learning alongside regular opportunities for retrieval practice to close this gap. Additional science capital is gained by all through

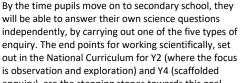


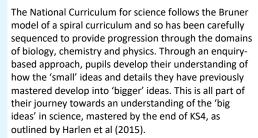
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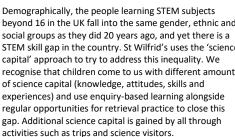
Disadvantage

Local Context

of study as this ensures cohesion and progression. PLAN Knowledge Matrices produced by the ASE and the key vocabulary list produced by STEM supplement the National Curriculum ensuring teachers recognise the powerful knowledge and core vocabulary all children must master.







Sheffield is one of the greenest cities in the world. St Wilfrid's is set within walking distance of Ecclesall Woods and two parks. We have a wildlife pond and woods on site. These resources are utilised to support the teaching of science in the real world and so enhance children's science capital.

IMPLEMENTATION



Pedagogical **Approaches**

We have an enquiry-based approach to learning in science as this has proven to be effective in enabling children to make strong connections between the 'smaller' ideas and details mastered in previous year groups and the 'bigger' ideas they are currently studying (Harlen et al 2015). Retrieval practice, as described by Rosenshine and rooted in cognitive science, is used at appropriate intervals to ensure children remember the key knowledge acquired through enquiry. This knowledge will form the 'smaller' idea in the next stage of their development.

The demonstration of good subject and curriculum

knowledge is a requirement in the DfE teaching standards.

To this end, it is expected that teachers whose curriculum

knowledge is not sufficiently developed will take steps to

address this gap (e.g. through reading or participating in

online training such as Reach Out CPD). It is essential that

teachers have the required level of expert knowledge so

misconceptions are anticipated and addressed as they arise.

that explanations are clear and accurate, and children's

An enquiry-based approach to science naturally leads to

conversation. Children share observations and findings and

help one another to make connections in their learning and

so develop a deeper understanding. Discussion (both pupil

to pupil and pupil to teacher) has an important role in the

teacher is key to allow pupils to practise new knowledge

and to help them make links between new material and

opportunities for science talk, key vocabulary, and so core

prior learning (Rosenshine). Essentially, through these

knowledge, is truly mastered.

development of scientific ideas. Effective questioning by the



Teachers' Expert Knowledge



Promoting Discussion and Understanding



Knowing More and Remembering More

Knowledge organisers set out the powerful knowledge, core vocabulary and big ideas that all children are expected to master. A first lesson for each unit of work is used to review the 'smaller' ideas mastered in previous units, ready for their development in the new one. Opportunities for retrieval practice are included in science lessons to ensure knowledge is transferred into long-term memory. Retrieval activities may require children to remember learning from the previous lesson, previous topic or even previous year to ensure the retrieval strength of powerful knowledge is high.



Teacher Assessment

Formative assessment is essential in the implementation of the science curriculum to ensure that all children are developing the declarative and procedural knowledge needed to ensure the further development of cognitive schemas of understanding which will move them on their journey from novice to expert. Effective questioning, as outlined in Rosenshine's principles, plays a fundamental role in checking for understanding and ensuring misconceptions are quickly addressed.

IMPACT

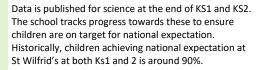


Approach to Assessment

The five strategies of formative assessment (Wiliam 2011) are used in science to support and promote deep learning. These provide the foundations for any summative assessments required e.g. at the end of KS1 and 2. Focussed assessment tasks, such as those shared on the PSTT website, and specific recall activities like quizzes, are used to enable teachers and children to monitor the depth of understanding of core procedural and declarative knowledge and the strength of its retrieval.



Performance Data





Pupils' Work

Pupils' work, in written and photographic forms and in both class folders and individual books, is used to secure and demonstrate children's learning. It informs teacher assessment, both formative and summative, and is used by subject leaders as part of the monitoring process. Greater independence in written work is evident in the higher year groups as enquiry becomes less scaffolded.



The subject leader talks to pupils about their learning as part of the monitoring process. Children's books and knowledge organisers are used to guide discussion and provide the subject leader with the information required to measure how much of the powerful knowledge and core vocabulary has been remembered and understood.

Links / References

Rosenshine's Principles in Action – Tom Sherrington The Teaching of Science in Primary School - Wynne Harlen and Anne Qualter Embedded Formative Assessment: (Strategies for Classroom Assessment That Drives Student Engagement and Learning) - Dylan Wiliam Science Capital - https://www.youtube.com/watch?v=A0t70bwPD6Y