



Science curriculum intent

At Birklands Primary School, we believe that developing:

- Independent learners
- Creative thinkers
- Socially confident and responsible citizens
- Cultural knowledge

will provide our pupils with the positive powers to make a difference in their lives and break the cycle of deprivation associated with the area that we serve.

The impact of this is that through the teaching and learning of science we:

- Develop and nurture curiosity and inquisitiveness by posing each lesson as a question.
- Provide all children with opportunities to develop a deep understanding of the world around them, acquiring specific skills and knowledge to help them to think scientifically independently.
- Develop rational thinking and encourage children to not just accept things, the need for evidence is key.
- Encourage creative thinkers when researching, investigating, exploring and experimenting possible answers/solutions to the question.
- Ensure that all lessons are interactive, encouraging peer talk, investigation and questioning preconceptions.
- Raising aspirations by immersing children in new knowledge and experiences, showing them that this subject opens up many opportunities to a multitude of careers they may not have previously considered.
- Develop determination, resilience, self-motivation and reflective thinking by actively highlighting scientists who have shown these traits through their research.
- Ensure that scientific knowledge and research is linked to wider understanding of the impact science has had/is having on society.

As a school, we have agreed that science coverage will be taught as a block unit of work to enable deeper thinking and broader understanding. Units of work and lessons are planned and delivered in accordance with Rosenshine's principles of instruction. The knowledge will therefore be memorable and transferable. Our planning format encourages staff to think deeper when planning each unit of work. Staff are asked to consider prior



learning, assessment opportunities, key vocabulary and definitions, new learning that will take place, key questions and how their lessons ensure children have opportunities to work scientifically. By including these headings within our planning format, we aim to improve the science teaching and learning across school, ensuring all learning develops children's scientific knowledge and skills. Through incorporating the teaching of key scientists into each science unit, we aim to broaden children's understanding of the multitude of opportunities that science can provide, raising aspirations and adding to their cultural capital.

THE PRINCIPLES OF INSTRUCTION

TAKEN FROM THE INTERNATIONAL ACADEMY OF EDUCATION

This poster is from the work of Barak Rosenshine who based these ten principles of instruction on suggested classroom practices on:

- research on how the brain acquires and uses new information
- research on the classroom practices of those teachers whose students show the highest gains
- findings from studies that taught learning strategies to students.



<p>01 DAILY REVIEW</p> <p>Daily review is an important component of instruction. It helps strengthen the connections of the material learned. It provides a mental review of working memory for problem solving and creativity.</p>	<p>02 NEW MATERIAL IN SMALL STEPS</p> <p>Our working memory is small, only holding a few bits of information at once. Avoid its overload — present new material in small steps and proceed only when first steps are mastered.</p>
<p>03 ASK QUESTIONS</p> <p>The most successful teachers spend more than half the class time lecturing, demonstrating and asking questions. Questions allow the teacher to determine how well the material is learned.</p>	<p>04 PROVIDE MODELS</p> <p>Students need cognitive support to help them learn how to solve problems. Modeling, worked examples and teacher thinking aloud help clarify the specific steps involved.</p>
<p>05 GUIDE STUDENT PRACTICE</p> <p>Students need additional time to rehearse, analyze and summarize new material in order to store it in their long-term memory. More successful teachers build in more time for this.</p>	<p>06 CHECK STUDENT UNDERSTANDING</p> <p>Less successful teachers rarely ask "Are there any questions?" No questions are not taken to mean no problems. False. By contrast, more successful teachers check on all students.</p>
<p>07 OBTAIN HIGH SUCCESS RATE</p> <p>A success rate of around 80% has been found to be optimal, showing students are learning and also being challenged. Better teachers taught in small steps followed by practice.</p>	<p>08 SCAFFOLDS FOR DIFFICULT TASKS</p> <p>Scaffolds are temporary supports to assist learning. They can include modeling, teacher thinking aloud, cue cards and checklists. Scaffolds are part of cognitive apprenticeship.</p>
<p>09 INDEPENDENT PRACTICE</p> <p>Independent practice provides <i>overlearning</i> — a necessary process for new material to be recalled automatically. This requires no overloading of students' working memory.</p>	<p>10 WEEKLY & MONTHLY REVIEW</p> <p>The effort involved in recalling recently learned material embeds it in long-term memory. And the more this happens, the easier it is to connect new material to each prior knowledge.</p>



At Birklands, each science lesson begins with a retrieval task linked to prior learning. This deliberate practice ensures that all learners are constantly revisiting and recalling prior learning in order to consolidate this understanding. This enables learners to apply their learning to other scientific concepts, allowing interleaving across the science curriculum. By interweaving prior knowledge, we ensure that the learning becomes embedded. Within each unit of work, there is an established element of awe and wonder linked to science, this is used to launch the science topic through either a visit, short video/film, practical investigation or demonstration. This allows us to promote creative thinking and give children the opportunities to develop their own lines of enquiry.

Through units of work, deep knowledge and understanding will be reinforced by the teaching of English, where appropriate, which will culminate in a quality end product. By linking the learning to the book journal approach, we aim to immerse all learners in the science topic. In addition to this, explicit links will be made to the maths curriculum, wherever possible ensuring children are able to develop a broader scientific and mathematical understanding.

Through the use of frequent and quality formative assessment, classroom feedback and support, children are encouraged to move forward in their scientific knowledge and understanding. Prior to teaching each science topic, children complete a pre learning task, in the form of a mind map, quiz, mini test or task. This task is then revisited after the learning has taken place, highlighting who has secure understanding and who needs more support in order to progress. Misconceptions are addressed throughout the unit of work and within lessons using skilled questioning, pre and post assessment, enabling children to make good progress.

At each data point, staff are expected to triangulate evidence to form their summative assessment judgements. These judgements should then shape any future science teaching and learning in that year group. We believe that robust assessment, through formative and summative means, can allow us to shape our curriculum to address any misconceptions and develop deeper thinking.