Science Rationale

What We Teach and Why We Teach it!

How do we teach our science curriculum?

Early Years (Nursery and Reception) – teach science through continuous provision and Forest Schools with adult’s supporting the children exploring the natural world and making observations using Birth to Five Matters for guidance.

Key Stage 1 (Yr. 1-2) teach science through continuous provision with adult directed tasks.

Key Stage 2 (Yr3– Yr6) teach an explicit 1 hour science lesson weekly.

Every KS1 and KS2 year group use the Science Bug Scheme to teach their unit through.

We do this because following the disruption to teaching caused by Covid we decided that we needed a consistent, whole school approach to teaching. The tasks and worksheets use high quality questioning and vocabulary to support learning. They include opportunity for discussion and practical hands-on learning. The progression within the lesson is clearly evident, ensuring that children understand the science knowledge before moving on to science skills-based tasks. The skills-based tasks allow children to apply their science knowledge learnt previously.

Why we use the Science Bug scheme of learning as a planning tool?

At Collierley, we use Science Bug because following a review of the science curriculum, we felt that the sequence of learning within the scheme was the most effective way of ensuring that our children make progress across each unit and through each key stage. The scheme ensures consistency across school and shows clear progression as each unit builds on children’s prior knowledge learnt from previous units. The Science Bug scheme allows for more practical hands-on learning creating engaging lessons, often involving high-quality resources to aid understanding of science skills. Each lesson has opportunities to use precise questioning using scientific vocabulary to measure conceptual knowledge and skills and assess children regularly to identify those children with gaps in learning, so that all children keep up.

How do we use assessment in science?

Children are assessed at the end of each unit (half-termly) through a practical-based assessment task linked to the skills and knowledge taught in that unit. Assessment is recorded on the assessment overview sheets, where children’s misconceptions and gaps in knowledge are also documented. This information is used to inform retrieval questions in the following unit’s lessons. The Science Lead uses these assessment sheets to monitor progress throughout the school.

We do this because assessment in science helps us track children's progress and ensure they are developing the necessary skills and knowledge for their age-related expectations. By assessing at the end of each unit through practical-based tasks, we can see how well children have understood and applied their learning in a meaningful way. Recording assessments on the assessment overview sheets allows us to identify misconceptions and gaps in knowledge, which are then used to inform retrieval questions in future lessons. This ensures that learning is revisited and reinforced, helping children to build on their understanding over time. The Science Lead monitors these assessments across the school to ensure consistency, track progress, and identify any areas where additional support or curriculum adjustments may be needed. This approach helps to maintain high standards in science and supports all children in achieving their full potential.

KS1 and KS2 - Pre and end of lesson assessments (mind-maps) are used and recorded in the floor books.

In KS1 and KS2, pre- and end-of-lesson assessments, mind maps, are used and recorded in floor books to help track children's understanding and progress within each lesson. The pre-lesson assessment allows children to share their prior knowledge related to the lesson objective. This helps teachers assess their current level of understanding, identify any gaps in learning, and address misconceptions before introducing new content. At the end of the lesson, the mind map is revisited to see what learning has taken place and whether any misconceptions still remain. If gaps in knowledge are identified, these are used to inform retrieval tasks in future lessons, ensuring that key concepts are reinforced and embedded over time. This approach supports a cycle of continuous learning, helping children to make connections, deepen their understanding, and build a secure foundation in science.

How does our curriculum support children with SEND?

At Collierley, we realise that we have children with widely different abilities in science and all must be given opportunities to display the knowledge and skills they withhold. We achieve this by setting common tasks throughout our science curriculum which will expect different outcomes. Each teacher will adapt their medium-term planning to ensure that each lesson has an expectation which can be met by all pupils. We group the children in different ways to enable each child to work on a task which is designed to meet their needs. Teaching assistants can support children either individually or in groups to scaffold their knowledge and development of skills.

How do our children learn more and remember more?

Each year group has a knowledge organiser, which helps to ensure that all key learning aims are met. These organisers can also be used at home to support children's learning by allowing them to review and revisit important scientific knowledge outside of lessons. Within lessons, children learn more and remember more through retrieval tasks at the start of each lesson. These retrieval tasks consist of 5-10 questions covering a range of science knowledge that has been taught in both previous and current years. This approach ensures that learning is regularly revisited, helping children to consolidate their understanding and strengthen their long-term memory.

Why do we do this?

* Strengthens Memory – Regular retrieval practice helps embed knowledge into long-term memory, making it easier for children to recall information when needed.
* Identifies Gaps – Retrieval tasks highlight any misconceptions or areas where children need further support, allowing teachers to address these promptly.
* Builds Connections – Revisiting previously learned content helps children see links between different topics, improving their overall understanding of scientific concepts.
* Improves Confidence – Regular practice in recalling knowledge boosts children's confidence in discussing and applying their learning.

By integrating retrieval tasks into every lesson, we ensure that children retain key scientific knowledge over time, enabling them to build on their understanding and make progress throughout the curriculum.

### This rationale supports the intent, implementation and impact statements for Science in Collierley Primary School.

**Intent**

Our intent is to provide a relevant, broad, vibrant, and ambitious Science curriculum that inspires and excites our pupils through a wide variety of topics and themes. Using the Science Bug scheme of learning, including its planning, resources, and assessments, we aim to ensure high expectations and excellent standards in science education. All pupils will be encouraged to achieve their full potential, with the ultimate goal of fostering a lifelong interest in science that continues beyond primary education.

The curriculum content will be continuously updated and reviewed annually, creating a dynamic programme of study clearly outlined in both long-term and short-term planning. This approach will ensure that pupils' scientific knowledge progresses each academic year and is extended year upon year throughout the primary phase, always remaining relevant and aligned with, or exceeding, national Department for Education (DfE) requirements.

**Implementation**

The delivery of Science contains the following;

* Teachers are responsible for planning and delivering up to 2 hours of science each week, using the Science Bug scheme of learning. This involves creating engaging lessons that utilise high-quality resources provided by Science Bug to enhance pupils' understanding of key scientific concepts.

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* Science is taught in units through a combination of whole class teaching, group and individual work. The units are objective lead and to ensure a balanced science curriculum it is essential that elements of the Attainment Targets are taught each year, with a particular emphasis on Scientific Investigation. Planning is to show clear progression through each unit and through each year group.

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* Working Scientifically to be embedded into lessons to ensure these skills are being developed throughout the children’s school career and new vocabulary and challenging concepts are introduced through direct teaching. Investigations and experiments are recorded in ‘class floor-books’ and work is evidenced using a range of ways including photos, shared writing, stem sentences etc. To ensure cross-curricular links, some sections of Working Scientifically can be taught in other subjects. For example: the constructing and interpreting result could be taught in maths, the recording of the method in English as a recount piece of writing.

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* The use of precise questioning using scientific vocabulary in class to measure conceptual knowledge and skills and assess children regularly to identify those children with gaps in learning, so that all children keep up.

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* Access to outdoor learning and workshops with experts to ensure children develop their understanding of their surroundings.

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* In Foundation Stage, children begin to explore the world around them, with specific Science work covered through the Early Learning Goal ‘Understanding the World’.

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* All children are encouraged and supported to develop their full potential in science. Some children may require extra support in the classroom and opportunities for consolidation and reinforcement. Activities are differentiated to meet the needs of all pupils.

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* At the start of each lesson, we incorporate ‘Learn More, Remember More’ tasks designed to help children recall and retain prior learning. These tasks take the form of questions displayed on the whiteboard, all based on topics covered in previous years. Children can answer these questions individually using their whiteboards or engage in whole-class discussions. This approach reinforces previous learning and helps embed knowledge and skills, ensuring that children retain and build upon their scientific understanding over time.

* Formative Assessment is used throughout the Science curriculum to guide the progress of individual children. This involves identifying each child’s understanding in each area of the Science curriculum, determining what they have learned, and planning the next steps in their learning journey. Teachers conduct formative assessments informally during their teaching. At the beginning of each unit, pre-lesson assessments are carried out and recorded in the floor book to determine what children already know about the lesson focus. This is written in red pen, allowing teachers to identify and address any misconceptions before new learning begins. At the end of each lesson, children are asked to reflect on what they have learned, and this is recorded in green pen. This approach helps gauge prior knowledge and identify any gaps in understanding. Formative assessment methods may include:

·       Targeted questioning during small group discussions.

·       Individual discussions encouraging children to reflect on their work and progress.

·       Marking and feedback on children’s work.

* Summative Assessment occurs at the end of each unit and at the end of each academic year when a level of the child’s attainment is determined. The summative assessment at the end of each unit is primarily practical, focused on scientific enquiry. Children are given a task or question and must use their learning to complete it. The teacher then uses assessment criteria to determine if children are Working Towards the Standard (WTS), Expected Standard (EXS), or Greater Depth within the Standard (GDS) for that unit. This assessment incorporates various formative assessments, including pre-lesson and end-of-unit evaluations documented in the floor books. These assessments help compile a comprehensive teacher assessment for each child, which is collected by the Science Coordinator at the end of each term and academic year.

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Throughout our Science teaching, we aim to cultivate a sense of awe and wonder about the world, encouraging children to explore, question, and understand the world around them.

**Impact**

By the time children reach the end of Key Stage 2 children will:

* Be curious about things they observe, experience and explore the world around about them with all of their senses.
* Use this experience to develop their understanding of key scientific ideas and make links between different phenomena and experiences.
* Acquire and refine the practical skills needed to investigate questions.
* Have skills of predicting, asking questions, making inferences, concluding and evaluating based on evidence and understanding and use the skills in investigative work.
* Have language skills through talking about their work and presenting their own ideas using sustained and systematic writing of different kinds.
* Use scientific and mathematical language including technical vocabulary and conventions and draw diagrams and charts to communicate scientific ideas.

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The outcomes will be measured using both formative and summative assessments outlined above. The Science Co-ordinator will ensure pupil progress and attainment is maintained through the monitoring of teaching and learning of Science throughout the school and will regularly meet with the SLT to discuss findings