



Science ON A PAGE

WHAT WE TEACH AND WHY – (intent)

Our intention is to develop a sense of wonder and curiosity about the world, so children understand the uses and implications of science today and for the future.

Our school values – The 6 Rs underpin everything we do at R A Butler Academy Schools. The core values are promoted through the skills of scientific enquiry and children meet them both as individuals and in collaboration with others. They are encouraged to be resourceful and respectful when organising equipment and to be resilient when analysing cause and effect. The children are articulate risk takers when they use a range of technical vocabulary to discuss scientific concepts and be reflective when drawing conclusions and evaluating.

Sequencing, content and progression – Our high-quality science curriculum is designed to be ambitious and inspiring but ensuring that key concepts and knowledge are covered effectively.

- Key skills and knowledge in biology, chemistry and physics are developed over the years through a programme of revisiting and extending, in accordance with the National Curriculum. The science progression document and LTP plan detail the progression of knowledge across the primary curriculum and the vocabulary progression document shows the progression of vocabulary across the school. The knowledge and vocabulary that the children will be taught in each unit is provided in the knowledge organisers, which are referred to when staff are planning and given to the children for their reference at the start of each unit. A science planning template is used in the two key stages and the first page provides staff with information about progression of knowledge and vocabulary.
- The Working Scientifically skills are woven through all units to enable the children to become independent investigative scientists and there is vocabulary progression for scientific enquiry across the two Key Stages.
- Science is taught in blocks as we feel that this aids memory retention. Science is a core subject and the amount of time that is made available to teach the subject reflects this.

School context - Investigations are conducted around the school using the local environment in the following topics across both KS1 and KS2: Living Things and their Habitats; Plants; Rocks and Soils; Light; and Seasonal Change. In addition, Forest School activities, cooking and gardening are used as vehicles for learning in EYFS.

Integrating literacy fluency and cross curricular learning – Topics are linked to other areas of the curriculum to ensure that practice reinforces new concepts and learning is purposeful.

- Our STEM projects in Years 5 and 6 combine the learning from science, DT and computing.
- Data handling in science supports the teaching of maths. For instance, in Year 6, the scientific enquiry skill to draw line graphs is covered immediately after this is taught in maths.
- The use of data loggers in Year 3, 4 and 6 create another opportunity to combine learning objectives from science, computing and maths.
- Extended pieces of writing, such as non-chronological reports, can be used as assessment tools at the end of science units. When appropriate, science lessons with a heavy writing content, such as an extended write at the end of a unit, becomes the English lesson.

HOW IT'S TAUGHT – (implementation)

Teaching for engagement and retention - Strategies are used routinely by teachers to enable the children to embed their learning into their long-term memory. These strategies are based on a range of techniques connected to retrieval practice: the use in lessons of knowledge organisers, low stakes quizzing, interleaving and annotated visual representations of information. We use active learning techniques which teachers employ in the classroom to complement learning and give all children the opportunity to become actively engaged and to articulate their understanding. Retrieval practice techniques are used in each lesson to consolidate previous learning.

Challenge at all levels - Baseline data from Early Years 'knowledge and understanding of the world' assessments are used to inform planning in Reception and Year 1. Individual class teachers differentiate learning for individual pupils and we aim to keep the pace of the lesson at the highest level to ensure that there is no 'glass ceiling' for any learner, whilst supporting less able children. If reading and writing are barriers to assessment, alternative forms of assessment are used. We are currently developing unit assessments for all year groups that combine written forms of assessment with quizzes to enable all children to demonstrate their knowledge, irrespective of their literacy skills. During practical investigations, the use of Post-it planning sheets can be used to support children in scientific investigations. Planning for each unit also includes extender questions to challenge children who are working at GD.

Evidence in books – Each unit of work will start with a Knowledge Organiser that the children can refer to throughout their unit. In KS1 there are photographs that show the scientific skills being used and simple worksheets to enable all children to demonstrate their knowledge. Floor books are also being explored in KS1 to record scientific enquiries carried out by each class. As the children progress across KS2, photographs and worksheets will also be used to demonstrate knowledge and skills but there will be more evidence of independent writing. By the end of KS2, there is evidence of children drawing their own scientific diagrams, tables and graphs.

Practical Investigations – Science should be made practical where possible to engage the interest of the children and develop their scientific enquiry skills. In each unit, a selection of scientific enquiry skills are explicitly taught and assessed, and over the course of the year, all of the scientific enquiry skills from the National Curriculum will be covered at least once. Safety is considered as part of the planning for each lesson and, where required, a separate risk assessment is carried out.

Staff knowledge and training - The Enthuse project, launched in January 2019, has enabled us to improve our links with industry (AstraZeneca) and promote greater collaboration between the schools in the partnership. Staff surveys were undertaken to identify gaps in teacher knowledge as part of this project and twilight sessions, such as those on electricity and forces, were organised as a result. The impact of this has been that staff have been able to create engineering projects that will engage children as they study electricity and forces in Years 5 and 6. Other Twilight sessions have focussed on investigative skills. The latest Ofsted report of the infant school (April 2019) stated that "staff training to improve subject knowledge...has resulted in some improvements in the teaching of science."

WHAT WE SEE AS A RESULT – (impact)

How science is assessed

The children's knowledge and understanding is assessed through their responses to questions in lessons, both verbal and written. Summative assessment, in the form of a quiz or an extended response to questions, also takes place at the end of each unit. The scientific enquiry skills specific to each unit are assessed through observations and children's written work. Our Working Scientifically Wheels support the assessment of disciplinary knowledge and raise children's awareness of when they are using scientific skills.

Assessment schedule

Assessment data is entered termly on Target Tracker and is based on the units of work and scientific enquiry skills that have been taught and assessed in that term.

Interventions

Pupils not meeting expectations after assessments are supported by the teacher as part of normal classroom practice.



Curriculum Enrichment

Our curriculum goes beyond the National Curriculum to deepen and enrich all of our pupils' knowledge and understanding both of particular subjects but also in respect of Cultural Capital knowledge and experience. We enrich our curriculum with additional experiences and learning across the school.

Year group	Activity	Knowledge	Real World application	Science in the locality	The nature of science and the way scientists work
EYFS	Visit to Shepreth Wildlife Park	To be able to understand about different animal habitats and how different animals are cared for	✓		
EYFS	Forest School	To use their senses to identify a range of plants and animals; to understand how plants and animals are affected by changing seasons; to learn about the habitats of animals and plants on the school site	✓	✓	
1	Visit to Colchester Zoo.	To be able to visualise the grasslands of Africa and be able to name different animals in this habitat	✓		
1	Visit to Bridge End Gardens	To identify and name a variety of common wild and garden plants, including deciduous and evergreen trees	✓	✓	
2	Animal Experience	To be able to identify animals from a rainforest habitat	✓		
2	Planetarium visit	To be able to experience our solar system, Moon landing and space travel virtually	✓		
3	Visit from staff at Saffron Walden Museum	To make observations about a range of scientific artefacts	✓		✓
4	Trip to Rye Meads.	To identify birds and pond life from a local habitat and construct food chains showing how these organisms are interdependent	✓	✓	
5	React 2023 – The Cambridge Science Festival	To learn about the role of different scientists through visits from local science researchers (a psychology researcher, an anthropologist and a astrophysicist) and produce art linked to these areas of science.	✓	✓	✓
6	Visit to Astra Zeneca's STEM Inspiration Lab	To learn about medicine making and the role of different scientists in the pharmaceutical industry.	✓	✓	✓
6	Herts and Essex Science Fair	To use the scientific method to investigate scientist concepts that interest them and how to present their findings effectively to their peers, adults and older children; to explore different jobs within STEM	✓		✓

Biannually, we also celebrate science week (alternately with art) welcoming in science-specialist parents to inspire children as well as local STEM Ambassadors. Science week supports the development of science capital by promoting enthusiasm for science across the school. By engaging with scientists, children can learn more about the nature of science and how scientists work, as well as make links between what they learn in their science lessons and the real-world application of the subject.

SMSC (spiritual, moral, social and cultural development)

Spiritual	Moral	Social	Cultural
- Consider the facts of life, growth, decay and death; and consider how different organisms are dependent upon each other. - Use senses to become more aware of the world around them. - Appreciate the beauty of the natural world. - Ask questions about life and its origins. - Develop a sense of awe and wonder at the complexity and pattern in natural phenomena. - Be fascinated about how things work and what might happen. - Develop a sense of wonder in scientific discovery. - Work with variables – learning to test hypothesis, accept failure and try again. - Learn to value and respect all forms of life. - Ethical issues – medical, nuclear, environmental, and the pursuit of truth in science vs. value to human life.	- Look at good and bad uses of drugs. - Explore moral issues in the human food chain. - Explore moral issues surrounding animals, including pets. - Recognise the need for a valid test. - Explore the consequences of certain action e.g. decomposition. - Investigate the laws of nature. - Use the scientific skills of making predictions, observing and drawing conclusions are helpful when considering moral issues. - Consider topics where science and religions both have something to say about the origins of the world and issues in medical ethics.	- Relate their understanding of science to their personal health e.g. personal hygiene, drugs, diet, smoking, exercise. - Look at health and safety issue, considering how to treat living things and the environment with care and sensitivity. - Look at ways in which the environment needs protection. - Explore why they need to look after the environment. - Explore the part played by science in civilisation. - Co-operate and communicate in groups, sharing expertise and skills.	- Recognise similarity and differences between themselves and other pupils. - Become aware that scientific discoveries are worldwide and not a western phenomenon. - Scientific development in relation to others – water supplies, new varieties of flowers and food crops.

Future plans and areas for development

- Improve children's awareness of how famous scientists have contributed to our understanding of science through explicit teaching and the use of high-quality knowledge organisers.
- Continue to monitor assessment and tools for assessment for example using the GD questions as a thinking hard task.
- Create further opportunities for curriculum enrichments and culture capital through links with STEM Ambassadors and secondary colleagues.