



Science - Intent, Implementation, Impact Statement

Intent

At Middlefield we aim to create a sense of excitement and curiosity about natural phenomena and an understanding of how the scientific community contributes to our past, present and future.

We want Middlefield pupils to develop knowledge of Biology, Chemistry and Physics, but also adopt a broad range of skills in working scientifically and beyond. In order to promote excitement about science we follow the Kapow scheme which is inclusive and meaningful, so all pupils may experience the joy of science and make associations between their science learning and their lives outside the classroom. Studying science allows children to appreciate how new knowledge and skills can be fundamental to solving arising global challenges.

Our curriculum aims to encourage critical thinking and empower pupils to question the hows and whys of the world around them.

The scheme encourages:

- A strong focus on developing knowledge alongside scientific skills across Biology, Chemistry and Physics.
- Curiosity and excitement about familiar and unknown observations.
- Challenging misconceptions and demystifying truths.
- Continuous progression by building on practical and investigative skills across all units.
- Critical thinking, with the ability to ask perceptive questions and explain and analyse evidence.
- Development of scientific literacy using wide-ranging, specialist vocabulary.

This scheme of work enables Middlefield pupils to meet the end of key stage attainment targets in the national curriculum and the aims also align with those set out in the national curriculum.

Implementation

In order to meet the aims of the National curriculum for Science and in response to the Ofsted Research review into Science, we have identified the following key strands:

- Scientific knowledge and understanding of:
 - Biology - living organisms and vital processes.
 - Chemistry - matter and its properties.
 - Physics - how the world we live in 'works'.

- Working scientifically - processes and methods of science to answer questions about the world around us.
- Science in action - uses and implications of science in the past, present and for the future.

Our Science scheme is a spiral curriculum, with essential knowledge and skills revisited with increasing complexity, allowing pupils to revise and build on their previous learning. A range of engaging recall activities promote frequent pupil reflection on prior learning, ensuring new learning is approached with confidence. The Science in action strand is interwoven throughout the scheme to make the concepts and skills relevant to pupils and inspiring for future application. Cross-curricular links are included throughout each unit, allowing children to make connections and apply their Science skills to other areas of learning and these are used where possible including in our outdoor learning environment.

Each unit is based upon one of the key science disciplines; Biology, Chemistry and Physics and to show progression throughout the school we have grouped the National curriculum content into six key areas of science:

Plants

Animals, including humans

Living things and habitats

Materials

Energy

Forces, Earth and space.

Pupils explore knowledge and conceptual understanding through engaging activities and an introduction to relevant specialist vocabulary. As suggested in Ofsted's Science research review (April 2021), the 'working scientifically' skills are integrated with conceptual understanding rather than taught discretely. This provides frequent, but relevant, opportunities for developing scientific enquiry skills. The scheme utilises practical activities that aid in the progression of individual skills and also provides opportunities for full investigations.

Each year group has an optional exploratory 'Making connections' unit that delves beyond the essential curriculum, assimilating prior knowledge and skills to evoke excitement and to provide an additional method of assessing scientific attainment. The lessons in these units are selected by year group teachers as appropriate.

Lessons incorporate various teaching strategies from independent tasks to paired and group work, including practical, creative, computer-based and collaborative tasks. This variety means that lessons are engaging and appeal to those with different learning styles. Knowledge organisers for each unit help to identify prior and future curriculum links to make the scheme as meaningful as possible and reinforce key technical terms.

Strong subject knowledge is vital for staff to deliver a highly effective and robust Science curriculum. Teachers are able to access teacher development videos and resources to develop subject knowledge, target fundamental misconceptions effectively and support ongoing CPD. Videos created by subject specialists feature troubleshooting advice for practical work that does not go to plan, suggested questioning and support for tackling misconceptions, as well as recordings of practical tasks that can be utilised as demonstrations in the classroom or to support pupil reflection on their own observations.

Impact

The impact is constantly monitored through formative assessment opportunities. Each lesson includes guidance to support teachers in assessing pupils against the learning objectives and any relevant scientific enquiry skills. Opportunities for children to communicate using scientific vocabulary also form part of the assessment process in each unit. Children are frequently asked to retrieve prior learning to support learning of new concepts.

Each unit of Science lessons is completed with a POP (proof of progress) task. The POP task is completed and assessed at a delayed time after the unit has been taught to assess depth of learning.

At the end of each term pupil's progress is recorded on the Insight system to allow the science subject lead to monitor progress across the school.

Periodically, throughout the academic year, the subject lead will conduct a 'Pupil Book Study', taking a selection of books from each year groups and analysing the prior learning. They will hold a focus group with children to discuss their learning and ascertain quality through vocabulary, sequencing and content.

After implementing Kapow Primary Science, pupils should leave school equipped with the requisite skills and knowledge to succeed in key stage 3 Science. They will have the necessary tools to confidently and meaningfully question and explore the world around them as well as critically and analytically experiencing and observing phenomena. Pupils will understand the significance and impact of Science on society.

The expected impact is that children will:

- Develop a body of foundational knowledge for the Biology topics in the National curriculum: Plants; Animals, Including Humans; Living Things and Their Habitats; Evolution and Inheritance.
- Develop a body of foundational knowledge for the Chemistry topics in the National curriculum: Everyday Materials; Uses of Everyday Materials; Properties and Changes of Materials; States of Matter; Rocks.
- Develop a body of foundational knowledge for the Physics topics in the National curriculum: Seasonal Changes; Forces and Magnets; Sound; Light; Electricity; Earth and Space.
- Be able to evaluate and identify the methods that 'real world' scientists use to develop and answer scientific questions.
- Identify and use equipment effectively to accurately gather, measure and record data.
- Be able to display and convey data in a variety of ways, including graphs.
- Analyse data in order to identify, classify, group, and find patterns.
- Use evidence to formulate explanations and conclusions.
- Demonstrate scientific literacy through presenting concepts and communicating ideas using scientific vocabulary.
- Understand the importance of resilience and a growth mindset, particularly in reference to scientific enquiry.
- Meet the end of key stage expectations outlined in the National Curriculum for Science.