Woodrow First School

Science Policy

Signed by:	
Reviewed by	**Joanne Clifford – SUBJECT LEAD**
Head Teacher	**Richard Kieran**
Chair of Governors	**Reg Moore**
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Our Vision

The science curriculum at Woodrow First School provides children with coherent, substantive knowledge of the scientific disciplines of biology, chemistry, and physics. Beginning first in the Early Years, leading into the National Curriculum, our curriculum has been designed to be progressive and explorative. Our aim is for children to have firm foundations for exploring bigger science concepts. As they leave our school we aspire for them to be confident scientists because our curriculum has provided a lens through which to study and contextualise science.

It also intends to embed core disciplinary knowledge, and the ability to systematically approach challenging, scientifically valid questions through:

- *Scientific Attitudes & Planning* asking relevant scientific questions and designing controlled investigations.
- *Measuring & Observing* learning how to use scientific apparatus like rulers and thermometers, and making systematic observations.
- *Recording & Presenting* setting up data collection tables and presenting this data in a variety of charts and graphs.
- *Analysing & Evaluating* interpreting and analysing findings; drawing conclusions and evaluating the reliability of investigations.

Our science curriculum is designed to create awe and wonder while inspiring a curiosity about natural phenomena and our world. Our 'Mantle of the Expert' approach provides a rich purpose for working scientifically and a platform to develop scientific knowledge, processes and inquiry. Alongside this, discrete science lessons are taught to ensure pupils have strong transferable skills to understand the world around them. It ensures that all pupils can see themselves reflected in the science curriculum, by highlighting present-day role models and the contributions of scientists from a wide range of backgrounds, considering social and cultural values around scientific ideas.

Aims

The national curriculum for science aims to ensure that all pupils:

• develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics

• develop understanding of the nature, processes and methods of science through different types of enquiries that helps answer questions about the world around them

• are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future

'Working scientifically' specifies the understanding of the nature, processes and methods of science for each year group. All ways of 'working scientifically' are clearly mapped out for progression and embedded within the content of biology, chemistry and physics, focusing on the key features of scientific enquiry. Pupils learn to use a variety of approaches to answer relevant scientific questions and will seek answers to questions through collecting, analysing and presenting data. 'Working scientifically' will be developed throughout Key Stage 1 and 2 in order to prepare pupils for further challenge that will be presented when they transition to key stages 3 and 4. The types of working scientifically we include are: Observing over time; pattern seeking; identifying, classifying and grouping; research; comparative and fair testing.

The Content of our Curriculum

Pupils at our school are taught to use a variety of approaches to answer relevant scientific questions and this is set out in a long-term plan.

Early Years Foundation Stage

The EYFS framework is structured very differently to the National Curriculum as it is organised across seven areas of learning rather than subject areas. The skills taught across EYFS feed into National Curriculum subjects. These statements from the 2020 Development Matters are prerequisite skills for science within the National Curriculum and show "Foundational Knowledge" for this subject.

Nursery

- Use all their senses in hands-on exploration of natural materials.
- Explore collections of materials with similar and/or different properties.
- Talk about what they see, using a wide vocabulary. Begin to make sense of their own life story and family's history.
- Explore how things work.
- Plant seeds and care for growing plants.
- Understand the key features of the life cycle of a plant and an animal.
- Begin to understand the need to respect and care for the natural environment and all living things.
- Explore and talk about different forces they can feel. Talk about the differences between materials and changes they notice

Reception

- Explore the natural world around them.
- Describe what they see, hear and feel while they are outside.
- Recognise some environments that are different to the one in which they live.
- Understand the effect of changing seasons on the natural world around them

Key Stage 1

Year 1

Year 1 Substantive Knowledge: Plants, Animals including Humans; Everyday materials and seasonal change

Disciplinary Knowledge: Ask simple questions; Sorting and Classifying; Survey; Research; Pattern Seeking; Observation over time; observe closely using simple equipment; Perform simple tests; questions can be answered in different ways.

Gathering and Recording Data: Record simple data to answer a question; make simple measurements; draw Venn diagrams and charts

Year 2

Year 2 Substantive Knowledge: Living things and their habitats; plants; Animals including humans; Uses of everyday materials

Disciplinary Knowledge: Survey; Identify and Classify; Comparative Test; Pattern Seeking; Observation over time and Research

Gathering and Recording Data: Record in a tally charts; Pictograms; block charts

Key Stage 2

Year 3

Year 3 Substantive Knowledge: Plants; Animals including humans; Rocks; Light and Forces and magnets

Disciplinary Knowledge: Fair Test; Classification: Comparative Test; Research; Investigation over time; Modelling; Child-led Investigation

Gathering and Recording Data: Record using drawings; Tables; Data in bar charts; Branching keys; Tally charts; Draw simple conclusions

Year 4

Year 4 Substantive Knowledge: Animals including humans; Living things and their habitats; Electricity; States of Matter; Sound

Disciplinary Knowledge: Identify & Classify; Problem Solve; Pattern Seek; Research; Comparative/Fair Test; Explain; Investigate over time; Child-led Investigation

Gathering and Recording data: Provide written and oral explanations; Use a data-logger or equivalent to take measurements; Use a thermometer to take measurements; record using labelled diagrams.

Planning and delivery

At Woodrow our careful planning and delivery of all curriculum areas ensures that we see the longer trajectory for learning outcomes and can therefore make purposeful curriculum links with other subject areas. Such forward thinking allows teachers to be creative in their approach to teaching science and can respond to the needs of their cohort by deciding whether to teach units discretely, or within our Mantle stories.

Progression of science knowledge

Early Years is the first opportunity to develop our children's curiosity for science. The frequency and range of children's personal experiences increases our children's knowledge and sense of the world around them. Our Mantle stories, discrete teaching and continuous provision in the Early Years are carefully planned to allow our children to explore their scientific interests and foster their understanding of our culturally, socially, technologically and ecologically diverse world.

In Key Stages 1 and 2 substantive knowledge ensures pupils master core content through the development of key concepts and timely revisiting of key knowledge. The careful planning and delivery of the curriculum prevents common misconceptions that are often formed at an early age and prove problematic at the later stages of pupils' science education from occurring. Pupils apply and make connections between the disciplines of science, the wider curriculum, and the wider world.

When teachers plan a unit, they begin with the end in mind, having clarity about exactly what they want the children to learn. Outcomes are clear and detailed, and each lesson has a concise learning intention. We are determined that children develop the progressive skills of a scientist throughout their time at Woodrow and not just learn a series scientific facts.

For learning to stick in the long-term memory we teach scientific knowledge in meaningful contexts and in a connected way. For each unit of learning, teachers plan for children to experience:

• The disciplinary knowledge needed to be successful scientists
• Co-operative and child led learning to ensure high levels of accountability and engagement for all children.
• A careers pathway that highlights the range of jobs and careers that learning in science can lead to.
• Educational visits and artefacts to enhance the learning experience. We enhance our curriculum especially for the most disadvantaged by organising guest speakers, science projects (STEM) and take our learning outside to work in woodlands, attend farm visits and maximise the school grounds (both inside and outside).
• To bring learning to life, lessons or parts of lessons take place in our immersive classroom to enable children to see first-hand the curriculum they are learning
• Questioning is used to allow pupils to consolidate knowledge and understanding where necessary or to apply learning in an open manner.
• Opportunities for all pupils to see themselves reflected in the curriculum by exploring present-day role models and the contributions of scientists from different backgrounds.
• To enable children of all abilities to access the curriculum, additional models and scaffolds are provided.

Progression of working scientifically and enquiry skills

Disciplinary knowledge (working scientifically) is sequenced so that they are explicitly taught and practiced alongside the substantive knowledge, and regularly reviewed and built upon across the years and key stages.

To ensure there is a consistent approach to teaching content, pupils are always first taught content in the most relevant subject. For children to make connections with other subjects, and deepen their learning, teachers deliver science content in the most appropriate subject for the cohort they are teaching. For example, pupils are taught how to construct bar charts in mathematics which is then applied in science. In addition, the need for bar charts may arise within the context of a class Mantle narrative which would motivate the need for the children to learn about bar charts. We plan practical tasks that have a clear purpose: to demonstrate or prove substantive concepts, or to allow pupils to deliberately practice working scientifically skills in a relevant context.

Progression of science vocabulary

Enriching and widening vocabulary will support later reading comprehension. As well as building important science knowledge and enquiry skills, as evidenced in our long and medium term plans, our progressive planning extends our children's familiarity with words that support understanding across each science domain.

Assessment and monitoring

Our curriculum is designed to be suitably challenging; we believe that if children are keeping up with the demands of each lesson, they are making good or better progress.

We measure the impact of our curriculum through the following methods:
• A reflection on standards achieved against the planned outcomes. Using the planning tool created, teachers can articulate the learning that has come before (in a previous year group or unit) and can use this information to see whether our children have retained science knowledge and/or enquiry skills at the age appropriate standard.

• We use a Venn diagram that balances science knowledge and working scientifically skills for each area of study to support our judgements, clearly identifying specific areas of need for each individual child.
• Pupil's books and pupil discussions about their learning.
• Writing opportunities are planned to provide children with the opportunity to write at length to demonstrate their knowledge gained at the end of the learning sequence.
• Teachers constantly interact with children assessing their thinking, knowledge, and understanding. Feedback is actionable, precise, and acted on by the children through self and peer assessment. This may include verbal comments, questions, written responses in self and in-context dialogue when in role in a Mantle team.
• Teachers review learning during learning, after the unit has been taught. Recall and retrieval practice is achieved through well thought through yearly plans where science is taught discretely and in combination with Mantle of the Expert imaginative contexts and appropriate curriculum links.

Monitoring

The outcomes of monitoring are used to secure even better science: data analysis, learning walks, moderating as a staff, observing lessons, planning and pupil voice.

Monitoring of science teaching is carried out through a program of lesson observations by the Science leader. Observations focus primarily on the effective communication of scientific knowledge and the quality of 'Working Scientifically'. Specific areas can be chosen as the focus for example: use of support staff, agreed in advance of the lesson. Following an observation, the teacher receives feedback and a copy of the notes.

Monitoring standards for Science achieves the following:
• To gain insight into the nature of science teaching across the school.
• It gives class teachers the opportunity to review their own practice and discuss teaching science with a subject specialist.
• It gives the science leader an insight into areas of strengths, enabling good practice to be shared among colleagues.
• It allows resources to audited for current and future resource requirements.
• It allows the science leader to set targets, demonstrating the school's commitment to self-evaluation and improvement of standards in science.
• It provides opportunities for bespoke support for areas of need

Reporting

Reports to parents on the attainment of their children are made verbally in the autumn and spring term and a written report is provided during the summer term. Reporting in science focusses on each child's progress in the ability to work scientifically and the level of scientific knowledge achieved: working below expected standard, working towards expected standard, age related expectation or above age related expectation.

Inclusion

To ensure our planning meets the needs of all children changes to pedagogy and content are made in consultation with the science Lead and the SENCO. The range of needs include those for whom language and communication difficulties are the result of sensory or physical impairment. For some, English may be an additional language requiring additional support. Pupils may have a speech and language delay,

impairments or disorders, specific learning difficulties as a result of dyslexia, dyspraxia or ADHD. Other difficulties in communication/interaction may have arisen from a disrupted education through illness or early childhood trauma. At Woodrow we ensure that we are aware of barriers to learning and we endeavour to meet the needs of all pupils in our school. Teachers will scribe for learners if recording is a barrier and this ensures that scientific understanding is assessed accurately.

Communicating ideas and understanding:
- Consider a variety of methods for communicating ideas
- Consider imaginative pieces of writing -e.g. The journey of the sandwich
- Adopt a multi-sensory approach
- Try not to introduce more than one concept at a time
- Consider how technical words are introduced
- Use physical movement to help to understand and therefore remember concepts
- Enable opportunities to discuss ideas in pairs
- Key vocabulary displayed

Health and safety

All staff make themselves conversant with the 'Be Safe' safety book (Association for Science Education, 2011) (Appendix A). This safety book feeds directly into our safeguarding policy. Staff will review this safety book annually and will be asked questions to monitor their knowledge of the safety book.

Appropriate reminders must be given to children about potential hazards and care of the equipment they are using; where appropriate these reasons are explained to them. When planning activities, safety issues are identified in detail in planning and acted upon accordingly. All staff members are responsible for collecting and returning items to the correct place to ensure that resources are easy to find and stored away safely. Any trips are planned with due regard to the school policy on taking children on outings. LEA guidance is sought on trips involving farms etc.

Role of the Subject Leader

The science leader uses research to keep up to date with developments in pedagogy. There is a deep understanding of the best ways to teach science across all phases of the school, so all teachers are confident in their teaching of science to deliver an enquiry-rich curriculum; with access to the appropriate resources. The leader can identify issues in science teaching and address this through appropriate CPD for all staff. The science leader has developed a whole school vision for science and ensures that science is valued as a core subject that builds skills across the curriculum.

Role of Governors

The role of the Governors is based on trust, openness and transparency. They know the school well. They will support the monitoring of science, ask questions for clarification or explanation and challenge.

Conclusion

It is the responsibility of all staff at Woodrow to share the love of learning in science and to model the curiosity in their everyday lives.