



Science Policy

Introduction

A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of declarative knowledge, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

Intent

Science teaching at the Emmaus Federation aims to give all children a strong understanding of the world around them whilst acquiring specific skills and knowledge to help them to think scientifically, to gain an understanding of scientific processes and an understanding of the uses and implications of Science, today and for the future.

Our Science teaching uses an enquiry process to allow pupils to learn for themselves. These processes, at work in the whole curriculum, are suited to the declarative and process knowledge required to be a scientist. We encourage children to both answer subject specific questions, but also ask their own questions about the world around them.

Our curriculum enables children to observe, problem-solve, investigate and question the changing world around them in their handling of scientific-based questions.

Within Science, we have identified the declarative knowledge to allow our pupils to become successful scientists. This is set out in more detail in our termly plans.

The ambitions for our curriculum:

- High aspirations permeate across the school
- The school offers a host of cultural experiences and enrichment opportunities
- Our pupils develop a love of life-long reading
- British Values are an intrinsic part of the school

Aims of the Science Curriculum

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 science enquiries that help them to answer scientific 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.

Teaching and Learning

Teachers are responsible for the teaching of Science. It is taught through topics of study which are based on the Science Curriculum (2014) with scope for teachers own initiatives and ideas.

Topics of study are arranged over a two-year rolling programme, to ensure continuity and progression of learning. Each topic of study is broken down into knowledge building blocks. These knowledge building blocks are carefully planned to sequence the knowledge taught and ensure they are built upon over time. The highlight the learning which has been taught before and what the pupils' need to know to reach their end point (spiral progression).

Each topic of study has a set of enquiry questions which are used to support the teaching and learning of Science. The enquiry questions are used on classroom working walls and through learning objectives. Enquiry questions are used as a starting point to a Science lesson to support the use of process knowledge within a lesson.

The science curriculum highlights the key vocabulary that will be taught for each topic of study. These are brought to life for pupils' on working walls, through knowledge organisers and within learning objectives for the lesson.

Teaching may be conducted in a whole class format or with small groups. Every lesson should have at least one element of 'Working Scientifically' integrated into it. This allows the children to develop their own ideas, ask their own questions and make decisions. Wherever possible learning is achieved through structured practical activity.

Weekly lessons will include:-

- The knowledge the children will acquire in the lesson in the format of 'by the end of this lesson I will know...'
- The enquiry question being covered.
- The key vocabulary which will be covered.
- The main teaching activity to be covered during the science lesson.
- Differentiated activities to allow all children to acquire the knowledge being taught at their own level of understanding.
- At least one element of working scientifically.
- Mis-conceptions are addressed by the teacher.
- Good deployment of all support staff.

- Where necessary, a risk assessment completed for the activity.

Working scientifically

Working scientifically is more than just fair testing. The framework in the new National Curriculum comprises five possible approaches. These are:

- **Observing changes over time** - What happens to my bean seeds after I plant them?
- **Looking for naturally-occurring patterns and relationships** – Does the size of a seed affect the size of the plant?
- **Identifying and classifying things** – Do all trees lose their leaves in Autumn? Which trees do and which trees don't?
- **Researching using secondary sources** - Gardeners say that growing beans is good for the soil. I wonder why they say that?
- **Comparative and fair testing** - Does it make any difference if I change the amount of water and light I give my plant? Why?

Teachers will need to be aware of the different ways of teaching working scientifically to answer different types of questions.

Science Curriculum in the Early Years Foundation Stage

The Early Years Foundation Stage curriculum is based on seven areas of learning aiming to promote all aspects of a child's development. In EYFS, Understanding the World involves guiding children to make sense of their physical world and their community. In addition, listening to a broad selection of stories, non-fiction, rhymes and poems will foster their understanding of our culturally, socially, technologically and ecologically diverse world.

The EYFS curriculum starts from birth and children progress through each stage of development aiming to achieve the Early Learning Goals by the end of their Reception year. EYFS Understanding the World will enable the children to:

- Provide children with have frequent opportunities for outdoor play and exploration.
- Encourage interactions with the outdoors to foster curiosity and give children freedom to touch, smell and hear the natural world around them during hands-on experiences.
- Create opportunities to discuss how we care for the natural world around us.
- Offer opportunities to sing songs and join in with rhymes and poems about the natural world.
- After close observation, draw pictures of the natural world, including animals and plants.
- Observe and interact with natural processes, such as ice melting, a sound causing a vibration, light travelling through transparent material, an object casting a shadow, a magnet attracting an object and a boat floating on water.
- Encourage focused observation of the natural world.
- Listen to children describing and commenting on things they have seen whilst outside, including plants and animals.

- Encourage positive interaction with the outside world, offering children a chance to take supported risks, appropriate to themselves and the environment within which they are in.
- Name and describe some plants and animals children are likely to see, encouraging children to recognise familiar plants and animals whilst outside.

Implementation

The Science curriculum is carefully structure and sequenced to ensure coverage and progression as the children move through the school. The curriculum is broken down into knowledge building blocks as the knowledge is sequenced and the built upon over time: what has been taught before and what the pupils' need to know to reach their end point – **spiral progression**. This is set out in more detail in our termly plans. The enquiry questions and the key vocabulary are implemented in our knowledge organisers and brought to life on working walls and within learning objectives for the lesson.

There are specific curriculum areas of knowledge that build together to enable our children to become successful Scientists. These are:

1. Scientific knowledge and conceptual understanding

Ensures that children develop a secure understanding of each key block of knowledge and concepts to progress to the next stage – biology, chemistry, and physics. Ensures that children build up an extended vocabulary and apply mathematical knowledge to their understanding of Science.

2. The nature, processes, and methods of Science

Support working scientifically which is to be embedded into every science lesson. Supporting children to focus on the key features of scientific enquiry, including observing, pattern seeking, identifying, and classifying.

3. Spoken Language

Reflects the importance of spoken language in pupil's development. Supports the quality and variety of language that pupils hear and speak. Develops scientific vocabulary and articulates scientific concepts clearly and precisely.

4. Ultimate questions

Uses 'big questions' of meaning, purpose and truth to explore the world around them. Also supports misconceptions to be addressed and challenged.

Application of Knowledge

To enable our children to become successful scientists, we have identified the application of knowledge that will be needed. The application of knowledge for each area of science studied is identified and this knowledge can then be applied across the whole curriculum so our children leave our school 'knowing more and being able to do more'. This is set out in more detail in our termly plans.

**Investigation,
Expression
Interpretation
Reflection
Empathy**

Application
Discernment
Analysis
Synthesis
Evaluation

Investigation – in science this includes:

- asking relevant questions;
- knowing how to use different types of sources as a way of gathering information

Expression – in science this includes:

- the ability to explain concepts, methods and practices;
- the ability to identify and articulate scientific understanding

Interpretation – in science this includes:

- the ability to draw meaning from scientific theories, theories and studies
- the ability to suggest meanings

Application – in science this includes:

- making the association in Science between chemistry, biology and physics.
- To ability to be able to apply a range of scientific knowledge and skills in a variety of contexts.

Discernment – in science this includes:

- explaining the significance of scientific studies and investigations

Analysis – in science this includes:

- distinguishing between opinion, belief, and fact
- distinguishing between the feature's methods of different investigations

Synthesis – in science this includes:

- linking significant features of history and Science together in a coherent pattern.

Evaluation – in science this includes:

- the ability to evaluate a finished product and scientific investigation.
- Distinguishing between opinion and fact.

Processes for Effective Learning in Science

1. Identify questions

This includes developing enquires through identifying questions, defining routes of enquiry through Science based questions and using the skill of investigation to answer the questions and enquiries.

2. Plan and carry out enquiries

This includes identifying a specific area of enquiry to be able to carry out and develop. This includes using the skills; questioning, predicting, observing, measuring, comparing, classifying and analysing a range of data, observations, and findings.

3. Present and explain findings

This involves presenting findings in a range of different ways; discussion, written reports, tables, graphs, classification grids. It includes the skill of communicating findings in a clear and concise way, suggesting interpretations of findings and analysing the range of information present.

4. Evaluate

This involves evaluating the conclusions made through enquiry and how this will impact on our own lives and the world around us.

The Daily Implementation of Science

- Knowledge Organisers: Children have access to key knowledge, language and meanings to understand Science and to use these skills across the curriculum.
- Working Walls: Science Working Walls throughout the school focus on key knowledge, vocabulary and questions and exemplify the terminology used throughout the teaching of Science.
- Subject specific vocabulary: identified through knowledge organisers and working walls and highlighted to the children at the beginning of and during lessons.
- EYFS: Reception children are given a secure grounding in the Prime Areas of learning, ensuring they have a good foundation on which to build through the specific areas, including Understanding the World. Areas of provision are enhanced to ensure vocabulary understanding and extension and develop understanding of the world around them.
- Books: Children will have access to a growing variety of subject specific fiction and non-fiction books, available in Science lessons, other lessons and in the class book area. Wherever possible, text-based writing will link to the Science being taught.
- Use of equipment: Where possible we use different equipment for the children to explore and investigate. We believe that handling real life science equipment enhances the children's scientific knowledge, understanding the skills and uses for different equipment.
- Consistent teaching sequence: Science lessons will include a range of learning opportunities including putting the learning in the big picture, placing the Science being studied in the context of previous learning, a brief review of previous lesson/s, specifying key vocabulary to be used and its meaning, conducting scientific enquiry using a variety of resources and or sources, pupils interpreting their findings and communicating their scientific knowledge and understanding appropriately, before evaluating their learning and comparing with other science topics studied as appropriate.
- Learning environment: The learning environment is designed to ensure children develop their Science knowledge and continue to know more and remember more. Working walls are key drivers to this, with teachers referring to them during lessons.
- Research: Children will be asked to research scientific aspects of their learning independently. This allows the children to have ownership over their curriculum and lead their own learning in Science.
- Basic skills -English, Maths and ICT skills are taught during discrete lessons but are revisited in Science so children can apply and embed the skills they have learnt

in a purposeful context. The expectation is that standards in writing in Science are comparable with standards in English lessons.

- Cultural Capital - We plan visits, visitors and in-school WOW days to provide first-hand experiences for the children to support and develop their learning.

Health and Safety

All activities need to be risk assessed and adequate precautions taken where appropriate. These need to be clearly stated in the lesson plan. The children are made aware of the reasons for safe practice and taught how to use scientific equipment safely during practical activities. Class teachers, support staff and the subject leader will check equipment regularly and report any damage, removing defective equipment and replacing as appropriate.

Equal Opportunities

We teach science to all children, whatever their ability and individual needs. We provide a broad and balanced education to all pupils. Through our science teaching, we provide learning opportunities that enable all pupils to make good progress.

We strive hard to meet the needs of those pupils with special education needs, those with disabilities, those with special gifts and talents and those learning English as an additional language and we that all reasonable steps to achieve this.

Role of the Science Coordinator

- Endeavour to promote a dynamic approach to the development of Science ensuring that it has a high profile.
- To evaluate the standards of Science teaching through the analysis of assessment data, book looks and learning journeys.
- To update the Science curriculum and oversee its implementation by other staff.
- Keep up to date with developments in Science.
- Report back on training attended.
- Advise and support staff with the teaching and learning of Science.
- Be responsible for overall auditing and upkeep of all school science resources and facilities. To organise any budgets made available from various funds and to ensure money is used to its best advantage.
- Regularly review and update the school policy statement and guidelines as required.
- To work closely with the lead governor for Science.

Signed By: A Westfield and G Gilliard

Position: Science Co-ordinator

Date: February 2022