Nythe Primary School
Science Curriculum

Excalibur Academies Trust's Intent

To build a continuum of learning from EYFS (Early Years Foundation Stage) to post A-Level. Through an aspirational, inclusive curriculum, our pupils will learn to become innovative, curious scientists. They will be challenged to think about the implications of science today and in the future, as responsible global citizens.

Nythe Primary School's Intent

Why do we teach this? Why do we teach it the way we do?

At Nythe Primary School, we aim to provide children with a body of scientific knowledge as well as knowledge of how the scientific method is used to develop and test facts and theories via scientific enquiry (substantive knowledge and disciplinary knowledge).

We emphasise the importance of science in every aspect of daily life and our teaching is centred around increasing pupils' knowledge of our world. In science, knowledge and process are interlinked so children use existing and taught knowledge as well as evidence from their own enquiry to support and embed their learning within a context.
The National Curriculum provides the structure and knowledge for the science curriculum being taught throughout the school. In Early Years, science is encountered in a range of learning areas. At this stage, they develop the vocabulary they need to be able to talk about science and gain experience in doing so. The curiosity and experiences created through this prepares them well to begin KS1.

Our science teaching offers opportunities for children to:

- develop substantive knowledge and conceptual understanding through the disciplines of biology, chemistry; physics and of earth sciences
- learn how a range of scientific skills are used by scientist to generate further knowledge, within the three main themes of planning, doing and reviewing;
- develop a knowledge of different types of scientific enquiry (identification and pattern seeking; observing over time; fair testing; research and exploration)
- become equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future;
- read about science, including current cutting-edge research;
- communicate their scientific information and present it in a systematic, scientific manner;
- develop a respect for and an understanding of the materials and equipment they handle and of their limitations
- develop their ability to make links with previous learning and a framework within which to embed future learning.
- learn about the science of our own location.

We endeavour to adapt the science curriculum to make it accessible to all of our pupils, irrespective of ability or background. We recognise that many of our children do not come from scientific backgrounds, and some will have low Science Capital on entry. Through this approach, we ensure that every chance is taken to "broaden what counts" in order to build on their Science Capital and embedding the belief that science knowledge and processes are relevant to them, their families and our community.

How will we ensure that children understand the "Big Ideas" of science?

We will provide children with the framework they need to see where scientific ideas are related and based on shared concepts. We recognise how important it is that our children develop a bank of knowledge that improves and grows as they move through our school. They need a body of knowledge related to existing scientific understanding but also a body of knowledge related to the scientific discipline. The combination of these two will allow them not only to understand how existing knowledge was obtained but also to understand how future questions can be approached. In turn they will become teenagers who have a framework in which to slot scientific knowledge from Key Stage 3 and later will become critical consumers, questioning information they are given and evaluating it effectively.

Implementation

What do we teach? What does this look like?

Teachers create a positive attitude to science learning within their classrooms and reinforce an expectation that all children are capable of achieving high standards in science. Our whole school approach to the teaching and learning of science involves the following:

- Science is taught as a discrete subject in planned blocks across the whole school, to have a project-based approach. This is a strategy to enable the achievement of a greater depth of knowledge and to clearly link prior learning to new learning. In most year groups, six topics are taught over the course of the year.

- Through our planning, we include problem solving opportunities that allow children to find out for themselves. Children are encouraged to ask their own questions and be given opportunities to use their scientific skills and research to discover the answers. This curiosity is celebrated within the classroom. Planning involves teachers creating engaging lessons. Teachers use precise questioning in class to test conceptual knowledge and skills, and assess children regularly to identify gaps in learning, so that all children keep up.

- Working Scientifically' skills are 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. This is developed through the year, in keeping with the units of learning.

- Teachers demonstrate how to use scientific equipment, and the various Working Scientifically skills in order to embed scientific understanding. Teachers find opportunities to develop children's understanding of their surrounding by accessing outdoor learning and workshops with experts.

- Children are offered a wide range of extra-curricular activities, visits, trips and visitors to complement and broaden the curriculum. These are purposeful and link with the knowledge being taught in class.

- Regular events, such as British Science Week and World Ocean Day, allow all pupils to come off-timetable, to provide broader provision and the acquisition and application of knowledge and skills. These events often involve families and the wider community.

Impact

What will this look like?

How is the learning assessed?

We use four main approaches to our assessment:

1. Quadrant quizzes

2. Precise questioning in class to test conceptual knowledge and skills to identify those children with gaps in learning, so that all children keep up - provides assessment as learning and assessment for learning.

3. Half-termly assessment for learning has two strands:

- A specific scientific skill is assessed each half-term within the context of an applied lesson. A different skill is assessed each half-term so that each of the six areas are assessed once each over the year.
- An End of Unit written paper assess the substantive knowledge taught that half term. The way in which children record their understanding varies to allow for differences in learning style and some children may respond verbally to a scribe.

4. Teacher's record attainment on Bromcom which enables the school subject lead and the classes next teacher to access accurate data. This shows whether children are working below, at or above the ARE. Teacher's record extra notes that may be specific to a given pupil or a common misconception on their planning documents. Future teachers will use this information, as well as the initial tasks they carry out themselves, to decide how best to support students in the next related topic.

How is the teaching monitored?

The subject leader monitors the weekly planning to ensure that it matches the MTP; that the knowledge content is covered and that the children are being given the opportunities to develop disciplinary knowledge as well as substantive knowledge.

How is the overall impact measured?

The teachers half-termly assessment data is recorded on Bromcom to help the subject leader identify children who are exceeding age-related expectations; those who are still working towards them and those whose progress has changed.
The subject leader carries out lesson observations to identify areas where teachers need more support. This also allows the subject leader to identify children working at greater depth and those needing more support. If needed these are followed up by joint work between subject leader and the teacher to plan the next topic.

The subject leader is supported by the Principal. Joint observations allow the subject leader to learn how to monitor and feedback effectively.

As well as providing up to date information and ideas about learning in science and managing the school science resources, the subject leader also models teaching with each teacher's own class, particularly where new initiatives are introduced.

Pupil voice is used to further develop the Science curriculum, through questioning of pupils' scientific knowledge as well as their views and attitudes to science to support the children's enjoyment of science and to motivate learners. We believe that children at Nythe Primary School receive a high-quality science education, that provides them with the foundations for understanding the world and a framework for the science they need to know in Key Stage 3.

Big Ideas/ Schema

The Big Ideas of Science are recurring themes that appear throughout the whole curriculum.

Each Learning Point that is taught will link to a Big Idea.

The 'Big Ideas' focus on the 4 main components of scientific knowledge: Physics, Chemistry, Biology and Earth Science

Physics
P1: The universe follows unbreakable rules that are all about forces, matter and energy.
P2: Forces are different kinds of pushes and pulls that act on all the matter that is in the universe. Matter is all the stuff, or mass, in the universe.
P3: Energy, which cannot be created or destroyed, comes in many different forms and tends to move away from objects that have lots of it.

Chemistry
C1: All matter (stuff) in the universe is made up of tiny building blocks.
C2: The arrangement, movement and type of the building blocks of matter and the forces that hold them together or push them apart explain all the properties of matter (e.g. hot/cold, soft/hard, light/heavy, etc).
C3: Matter can change if the arrangement of these building blocks changes.

Biology
B1: Living things are special collections of matter that make copies of themselves, use energy and grow.
B2: Living things on Earth come in a huge variety of different forms that are all related because they all came from the same starting point 4.5 billion years ago.
B3: The different kinds of life, animals, plants and microorganisms, have evolved over millions of generations into different forms in order to survive in the environments in which they live.

Earth science
E1: The Earth is one of eight planets that orbit the sun.
E2: The Earth is tilted and spins on its axis leading to day and night, the seasons and the climate.
E3: The Earth is made up of several layers, including a relatively thin, rocky surface which is divided into tectonic plates, and the movement of these plates leads to many geologic events (such as earthquakes and volcanoes) and geographical features (such as mountains.)

Key Concepts

Through the science curriculum, pupils will develop an understanding of the following key concepts. These provide lenses through which to consider the different aspects of science and are revisited through different units as pupils move through the school.

Biology: adaptation, evolution, energy, growth, genetic information, classification, pollination, ecosystem
Physics: magnetism, force and movement, energy
Chemistry: materials, states of matter
Earth Science: universe, seasons, climate

Disciplinary Knowledge

Through each unit of science, the following disciplinary knowledge is explored. These can be used across all aspects of a subject to organise the substantive knowledge taught.

- Methods to answer scientific questions.
- Apparatus and techniques, including measurement.
- Analysis, presentation and evaluation of scientific data to draw valid conclusion.
- Development of scientific knowledge over time and its implications.

This is organised into 5 enquiry types:


Pattern-seeking


Research using secondary sources


Comparative and Fair Testing


Observing over time


Identifying, Classifying and Grouping

EYFS Curriculum

Our curriculum is based on the Statutory Framework for the Early Years Foundation Stage document, Department for Education, 2021, and the supporting guidance: Development Matters in the Early Years Foundation Stage (EYFS), Department for Education, 2020.

Children learn to make sense of the world in their own way through play and first-hand experiences. Some aspects of the Key Stage One and Key Stage Two (Y1-Y6) science curriculum have their roots in the EYFS learning experiences and are reflected in a range of goals across this interconnected curriculum, but most notably in the following areas: 'Understanding the World' and 'Physical Development'.

The EYFS Framework 2021 states that understanding the world requires children to make sense of their physical world and their community. In the Early Years we will foster a child's understanding domain-specific language and begin their understanding of the key concepts of growth, energy, classification and seasons.

Curriculum planning is based on child-initiated and adult led learning. Through exploration, play and teacher led activities, our pupils discover the features of the local environment and how to care for it. They will talk about and discover their immediate environment looking at both natural and manmade structures as well as discussing the weather and seasons from first-hand experiences. They also discover how our environment may differ to those of friends and family who live in the wider world. In our teaching we guide children to make sense of their physical world and their community through providing opportunities for them to explore, observe and find out about people, places, technology and the environment. We teach our children to understand the importance of physical activity, and to make healthy choices in relation to food.

Please see our bespoke EYFS Curriculum for more details.

Scheme of Work Overview

Year Group	Unit Coverage					
Year 1	Seasonal Changes	Animals including humans	Animals including humans (Ext unit)	Materials British Science Week	Materials (Ex Unit)	Plants
Year 2	Living things and habitats.	Materials	Animals including humans	Animals including humans (Ext Unit) British Science Week	Plants	Plants (Ext Unit)
Year 3	Rocks	Light	Forces and magnets	British Science Week	Animals including humans	Plants
Year 4	Animals including humans	Sound	States of matter	British Science Week	Electricity	Living things
Year 5	Forces	Properties of materials	Space	British Science Week	Living things and habitats	Animals including humans
Year 6	Animals including humans	Evolution and inheritance	Electricity	British Science Week	Light	Living things and habitats