Sir Alexander Fleming Primary School and Nursery
Science Policy

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What is Science?

Science makes people reach unselfishly for truth and objectivity; it teaches people to accept reality, with wonder and admiration, not to mention the deep awe and delight that the natural order of things brings to the true scientist."

LISE MEITNER: PHYSICIST 1953

At Sir Alexander Fleming Primary School and Nursery, we want our children to be naturally curious about the world around them. Our curriculum has been developed by staff to ensure full coverage of the National Curriculum and to foster a sense of wonder about natural phenomena. We are committed to providing a stimulating, engaging and challenging learning environment. Throughout our school children are encouraged to develop and use a range of working scientifically skills including questioning, researching and observing for ourselves. We promote and celebrate these skills. We want our children to have a broad vocabulary. Scientific language is to be taught and built upon as topics are revisited in different year groups and across key stages. We intend to provide all children regardless of ethnic origin, gender, class, aptitude or disability with a broad and balanced science curriculum.

Aims

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

* develop lively, enquiring minds and the ability to question.
* learn scientific skills and knowledge.
* build on their natural curiosity and enable them to understand and care for the world in which they live.
* are provided with an environment where they can work in an investigative way and can communicate their findings in a variety of ways.
* Can use equipment safely and sensibly.
* develop the potential scientific links with all other areas of the curriculum.

* 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.

Science and Curriculum

In Sir Alexander Fleming Primary School, we base our teaching on the National Curriculum Programmes of Study and this is particularly helpful with ensuring that there is continuity and progression.
The National Curriculum document for Science sets out a clear, full and statutory requirement for all children. It determines the content of what will be taught, and sets attainment targets for learning. The programmes of study set out what should be taught at Key Stage 1 and 2 and The Foundation Stage programmes of study for Understanding of the World are set out in the EYFS.

Organisation

Foundation Stage

Children enter our Nursery classes in the September after their third birthday. Then continue to develop their scientific enquiry in Reception as part of the EYFS. The EYFS stage sets out the learning objectives for the seven areas of learning:
*Physical Development
*Expressive Arts and Design
*Personal, Social and Emotional Development
*Literacy
*Understanding the World
*Communication and Language
*Mathematics

KS1

Year 1 Plants:

- identify and name a variety of common wild and garden plants, including deciduous and evergreen trees
- identify and describe the basic structure of a variety of common flowering plants, including trees.

Animals and plants including humans

- identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals
- identify and name a variety of common animals that are carnivores, herbivores and omnivores
- describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)
- identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.

Everyday materials

- distinguish between an object and the material from which it is made
- identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock
- describe the simple physical properties of a variety of everyday materials
- compare and group together a variety of everyday materials on the basis of their simple physical properties.

Seasonal change

- observe changes across the four seasons
- observe and describe weather associated with the seasons and how day length varies.

Year2

Living things and their habitats

- explore and compare the differences between things that are living, dead, and things that have never been alive
- identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other
- identify and name a variety of plants and animals in their habitats, including micro-habitats
- describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.

Plants

- observe and describe how seeds and bulbs grow into mature plants
- find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.

Animals including humans

- notice that animals, including humans, have offspring which grow into adults
- find out about and describe the basic needs of animals, including humans, for survival (water, food and air)
- describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.

Uses of everyday materials

- identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses
- find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.

KS2

Year 3

Plants

- identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers
- explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant
- investigate the way in which water is transported within plants
- explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.

Animals including humans.

- identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat
- identify that humans and some other animals have skeletons and muscles for support, protection and movement.

Rocks

- compare and group together different kinds of rocks on the basis of their appearance and simple physical properties
- describe in simple terms how fossils are formed when things that have lived are trapped within rock
- recognise that soils are made from rocks and organic matter.
- Linked with work in geography, pupils should explore different kinds of rocks and soils, including those in the local environment.

Light

- recognise that they need light in order to see things and that dark is the absence of light
- notice that light is reflected from surfaces
- recognise that light from the sun can be dangerous and that there are ways to protect their eyes
- recognise that shadows are formed when the light from a light source is blocked by a solid object
- find patterns in the way that the size of shadows change.#

Forces and magnets.

- compare how things move on different surfaces
- notice that some forces need contact between two objects, but magnetic forces can act at a distance
- observe how magnets attract or repel each other and attract some materials and not others
- compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials

- describe magnets as having two poles
- predict whether two magnets will attract or repel each other, depending on which poles are facing

Year 4

Living things and their habitats

- recognise that living things can be grouped in a variety of ways
- explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment
- recognise that environments can change and that this can sometimes pose dangers to living things.

Animals including humans.

- describe the simple functions of the basic parts of the digestive system in humans
- identify the different types of teeth in humans and their simple functions
- construct and interpret a variety of food chains, identifying producers, predators and prey.

States of matter.

- compare and group materials together, according to whether they are solids, liquids or gases
- observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)
- identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.

Sound

- identify how sounds are made, associating some of them with something vibrating
- recognise that vibrations from sounds travel through a medium to the ear
- find patterns between the pitch of a sound and features of the object that produced it
- find patterns between the volume of a sound and the strength of the vibrations that produced it
- recognise that sounds get fainter as the distance from the sound source increases.

Electricity

- identify common appliances that run on electricity
- construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers
- identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery
- recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit
- recognise some common conductors and insulators, and associate metals with being good conductors.

Year 5

Living things and their habitats

- describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird
- describe the life process of reproduction in some plants and animals.

Animals including humans.

- describe the changes as humans develop to old age.

Properties and changes of materials.

- compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets
- know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution
- use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating
- give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic
- demonstrate that dissolving, mixing and changes of state are reversible changes
- explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.

Earth and space

- describe the movement of the Earth, and other planets, relative to the Sun in the solar system
- describe the movement of the Moon relative to the Earth
- describe the Sun, Earth and Moon as approximately spherical bodies
- use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.

Forces

- explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object
- identify the effects of air resistance, water resistance and friction, that act between moving surfaces
- recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.

Year 6

Living things and their habitats.

- describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals
- give reasons for classifying plants and animals based on specific characteristics.

Animals including humans.

- identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood
- recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function
- describe the ways in which nutrients and water are transported within animals, including humans.

Evolution and inheritance

- recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago
- recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents
- identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.

Light

- recognise that light appears to travel in straight lines
- use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye
- explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes
- Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.

Electricity

- associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit
- compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches
- Use recognised symbols when representing a simple circuit in a diagram.

Working Scientifically

Working scientifically at Sir Alexander Fleming is an intregal part of all science teaching and is not taught as a separate strand. 'working scientifically' specifies the understanding of the nature, processes and methods of science for each year group. The notes and guidance in the National Curriculum give examples of how 'working scientifically' might be embedded within the content of biology, chemistry and physics, focusing on the key features of scientific enquiry, so that pupils learn to use a variety of approaches to answer relevant scientific questions. Engaging Science scheme, which enable for a range of scientific enquiry, is also available and should be embedded within lessons, across school. These types of scientific enquiry include:

- observing over time
- pattern seeking
- identifying, classifying and grouping
- comparative and fair testing (controlled investigations)
- researching using secondary sources

Pupils should also seek answers to questions through collecting, analysing and presenting data.

Links with other subjects

As much as possible, we aim to make cross-curricular links within the teaching of Science and these can be seen in our creative curriculum termly overviews.

Planning

Planning is the responsibility of the class teachers who deliver the lessons across the school. Guidance and support will be provided by the Science co-ordinator. Planning is used to:

- Set clear achievable goals;
- Ensure work is matched to pupils' abilities, experiences and interests;
- Ensure progression, continuity and subject coverage throughout the school;
- Provide criteria for assessment and evaluation of teaching and learning.

Long Term Planning

Our long-term planning outlines the units to be covered during Key Stages 1 and 2. (These will be held centrally on the 'T' drive 'Workgroup' and in the co-ordinator's subject file.)

Throughout both Key Stages 1 and 2, the children will have the opportunity to work on each of the different areas on a weekly basis.

Medium Term Planning

Termly learning objectives are derived from the long-term planning for each year group.

Short term Planning

Teachers will produce an objective based lesson plan in accordance with the medium term planning grids. As science is a core subject it is taught weekly rather than ‘blocked’, and a whole afternoon is allocated for this by teachers.

Resources

Written resources are kept on the ‘T’ drive ‘Workgroup’ or in the co-ordinator’s subject file, whilst tools, materials and teaching aids are stored in the science cupboard. All members of staff for their year group should pre-plan necessary resources required well in advance of each new unit of work. The science co-ordinator should be informed of all new resources ordered through the main office and informed when resources run out or are broken.

Assessment and Record Keeping

Pupils are assessed throughout each half term and progress is recorded in accordance with our progression of skills document for science. Progress is assessed and recorded through O’track.
Formative forms of assessment are used throughout the year through the use of marking, questioning, peer and self-assessment.

Monitoring and Reviewing

The Science co-ordinator is responsible for monitoring the standards of children's work and the quality and breadth of teaching. The coordinator supports colleagues in the teaching of Science by informing them of current developments in the subject and by providing a strategic lead and direction for the subject in school.
The co-ordinator is also responsible for evaluating strengths and weaknesses in the subject and identifying areas for improvement and development. Subject Leader release time will enable the coordinator to fulfil the role, reviewing medium term plans, monitoring children's work and observing teaching in the subject.

The Role of the Co-ordinators

The Subject co-ordinator is responsible for improving the standards of teaching and learning in science through CPD, book monitoring and observations.

Health and safety

The document 'National Curriculum in England' recognises that Health and Safety issues are an important feature of the science curriculum.

Teachers should be alert to safety issues and potential hazards and should teach children how to approach hazards in a safe way. Children should be encouraged to make risk assessments and take reasonable precautions for themselves.

The publication 'Be Safe!' (Published by the Association for Science Education - ASE) contains information and advice about aspects of safety in science, and is available through the ASE website. CLEAPSS website also contains information and advice about aspects of science safety.

General Guidelines

In science, pupils will need to acquire a range of skills, and work with a variety of materials, substances, tools and apparatus. Whilst planning for science activities, teachers will consider and comply with the following:-

- Train children, through demonstrations and positive guidance in safe ways to use tools and equipment, and in aspects of personal hygiene (washing hands after practical work and before working with food).
- Familiarise themselves and with safe practice, trying out tools, apparatus, techniques or procedures to ensure safety.
- Ensure that adults other than teachers involved in activities are familiar with safe practices.
- Ensure that, during activities that require close supervision, only a manageable number of children are involved at one time; this is suggested to be a maximum of 4 children.
- Ensure that, if an emergency occurs which requires a teacher to leave the class unattended, all children stop work until the teacher returns. Electrical equipment will be switched off and hazardous apparatus removed.
- Involve the children in good working practices including looking after and replacing equipment and materials after use.
- Know the location of the First Aid Box and be aware of the school's Accident and Emergency procedures.