



Policy for SCIENCE

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A Farrington

Science Policy 2018

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Section 1: Introduction

Introduction

Science is the stimulus through which children can learn about themselves and the world around them. At Dorridge Primary School, we aim to provide every child with the excitement, interest, and opportunity to explore and investigate.

Background documentation

- Related documentation: National Curriculum, IPC and Engaging Science by Mary le Brueilly

Section 2: Nature and Definition

In agreement with the purpose of study outlined in the National Curriculum, we believe that:

“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 key foundational knowledge and concepts, 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.”

Section 3: Aims

Science teaching at Dorridge Primary School aims to ensure that all pupils will:

- Develop their scientific knowledge and conceptual understanding of important ideas, processes and skills with the ability to relate these to everyday experiences;
- Learn about various types of enquiry to assist with communicating their ideas; and
- Explore values and attitudes through science especially an appreciation of themselves and their environment.

Section 4: Objectives

Science and the National Curriculum

EYFS

Knowledge & Understanding of the World is the focus for scientific enquiry in EYFS. Through curiosity and interest, pupils will explore the world around them. Whilst investigating, they will have the opportunities to notice similarities and differences and observe, identify and name key features and properties.

Key Stage 1

The principal focus of science teaching in Key Stage 1 is to enable pupils to experience and observe phenomena, looking more closely at the natural and humanly constructed world around them. They will be encouraged to be curious and ask questions about what they notice. They will be helped to develop their understanding of scientific ideas by using different types of scientific enquiry to answer their own questions, including observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests and finding things out using secondary sources of information. As they begin to use simple scientific language to talk about what they have found out, they will be able to communicate their ideas to a range of audiences in a variety of ways. Most of the learning about science should be done with first-hand practical experiences, but there should also be some use of appropriate secondary sources, such as books, photographs, and videos.

Lower Key Stage 2

The principal focus of science teaching in lower Key Stage 2 is to enable pupils to broaden their scientific view of the world around them. They will be given the opportunities to do this through exploring, talking about, testing, and developing ideas about everyday phenomena and the relationships between living things and familiar environments, and by beginning to develop their ideas about functions, relationships and interactions. They will be encouraged to propose their own questions about what they observe and make some decisions about which types of scientific enquiry are likely to be the best ways of answering them, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple fair tests and finding things out using secondary sources of information. They should draw simple conclusions and use some scientific language, first, to talk about and, later, to write about what they have found out. Pupils should read and spell scientific vocabulary correctly and with confidence, using their growing word reading and spelling knowledge.

Upper Key Stage 2

The principal focus of science teaching in upper Key Stage 2 is to enable pupils to develop a deeper understanding of a wide range of scientific ideas. By exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically, they will be able to acquire such skills. At upper Key Stage 2, they encounter ideas that are more abstract and should begin to recognise how these ideas help them to understand and predict how the world operates.

They will begin to recognise that scientific ideas change and develop over time. They will be able to select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out fair tests and finding things out using a wide range of secondary sources of information. Pupils will be encouraged to draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings using correct spelling, and pronunciation of scientific vocabulary.

Scientific knowledge and conceptual understanding

The programmes of study studied at each key stage describe a sequence of knowledge and concepts. While it is important that pupils make progress, it is also vitally important that they develop secure understanding of each key block of knowledge and concepts in order to progress to the next stage. Pupils should be able to describe associated processes and key characteristics in common language, but they should also be familiar with, and use, technical terminology accurately and precisely. They should build up an extended specialist vocabulary. They should also apply their mathematical knowledge to their understanding of science, including collecting, presenting, and analysing data. The social and economic implications of science are important and will be taught appropriately within the wider school curriculum of IPC. Thereby teachers will be able to use different contexts to maximise their pupils' engagement with and motivation to study science.

The nature, processes, and methods of science

'Working scientifically' specifies the understanding of the nature, processes and methods of science for each year group. This is not taught as a separate strand. It is 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. These types of scientific enquiry include: observing over time; pattern seeking; identifying, classifying and grouping; comparative and fair testing (controlled investigations); and researching using secondary sources. Pupils are encouraged to seek answers to questions through collecting, analysing, and presenting data.

Spoken language

The national curriculum for science reflects the importance of spoken language in pupils' development across the whole curriculum –cognitively, socially, and linguistically. The quality and variety of language that pupils hear and speak are key factors in developing their scientific vocabulary and articulating scientific concepts clearly and precisely. They must be assisted in making their thinking clear, both to themselves and others, and teachers should ensure that pupils build secure foundations by using discussion to probe and remedy their misconceptions.

Section 5: Pupil Entitlement

Inclusion

All pupils are entitled to receive learning experiences that have been planned to incorporate all of the requirements of the 2014 National Curriculum for Science.

By the end of each key stage, pupils are expected to know, apply, and understand the matters, skills, and processes specified in the relevant programme of study.

Equal Opportunities

Effective learning opportunities in Science will be provided for all pupils including those with Special Educational Needs. Please refer to the Policy for Inclusion, the Policy for Special Educational Needs, and the Policy for Equal Opportunities.

Differentiation

Differentiation is the process by which curricular objectives, teaching and assessment methods, resources and learning activities are planned and organised to provide opportunity for children of all abilities to develop their scientific understanding and demonstrate their achievements.

By careful monitoring, the teacher will decide the relevant method of differentiation suitable for the various abilities within the class.

Differentiation can be facilitated by selection of groups of children, the resources provided, the difficulty of the task required, or the outcome of the activity.

For pupils who have Special Educational Needs, a much greater degree of differentiation may be necessary. In these circumstances, the class teacher in consultation with the Special Needs Co-ordinator will devise activities appropriate to the requirements of the children.

Section 6: Curriculum Management

Role of subject leader

- Lead the development and implementation of the policies and schemes for Science.
- Develop and maintain good subject knowledge and be aware of national and local developments.
- To organise the resources for Science
- To monitor and evaluate the quality and effectiveness of the teaching and learning in Science throughout the school through agreed and appropriate processes of classroom observation, discussion with staff and children and examination of children's work.
- To evaluate the effectiveness of the policy and scheme for Science.
- To develop assessment and recording methods for Science.
- To support all year groups with assessment and moderation of Science.
- To identify professional development needs, attend relevant courses and disseminate information to staff.
- To liaise with governors when required.

Liaison

- Represent the school as subject leader.
- Liaise with colleagues, the Governing Body and professional external bodies as and when necessary

Organisation

- Review and revise the catalogue of existing resources at the beginning of each school year.
- Monitor the maintenance, and control the use of resources

Training

- Keep informed of developments in Science
- Submit a School Development Plan Action Plan for Science to the Head Teacher.

Resources

Science resources and equipment are centrally stored and maintained by the subject leader. The subject leader is also responsible for purchasing new items.

The 'Jubilee Garden' environmental area and surrounding school grounds are also essential resources, which enhance and enrich the children's learning.

Whole school involvement in National Science week is a further commitment to ensure appropriate links to science units.

7: Curriculum Organisation and Enhancement

Learning across the national curriculum

Science is timetabled for approximately two hours per week in key stage 2 and 1 hour a week in key stage 1. Our scheme of work is primarily based on Engaging Science with further supplements to enhance the scheme where appropriate, namely Science Week. Links to IPC units are made where appropriate.

Each year group uses these units to develop their mid-term plans and short-term weekly plans. Differentiation strategies will be identified by the class teacher, as they take into account the individual needs of the children.

The Science curriculum is differentiated with regard to the age, needs, and ability of the pupils through for example:

Features of progression

To ensure that children make progress in science, teaching should provide opportunities for children to progress:

- from using everyday language to increasingly precise use of technical and scientific vocabulary, notions and symbols;
- from personal scientific knowledge in a few areas to understanding in a wider range of areas and of links between areas;
- from describing events and phenomena to explaining events and phenomena;
- from explaining phenomena in terms of their own ideas to explaining phenomena in terms of accepted ideas or models;
- from participating in practical science activities to building increasingly abstract models of real situations;
- from unstructured exploration to more systematic investigation of a question;
- from using simple drawings, diagrams and charts to represent and communicate scientific information to using more conventional diagrams and graphs.

Throughout the school, pupils learn about a wide range of living things, materials and phenomena by:

- beginning to make links between ideas and to explain things using simple models and theories;
- applying their knowledge and understanding of scientific ideas to familiar phenomena, everyday things, and their personal health;
- thinking about the positive and negative effects of scientific and technological developments on the environment and in other contexts.

They will carry out systematic investigations working on their own, and with others. A range of reference sources will be made available and the children will be encouraged to talk about their work and its significance, and communicate ideas using a wide range of scientific language, conventional diagrams, charts, and graphs.

Section 8: Teaching and Learning Styles

Organisation of Learning

In science, a whole range of teaching and learning strategies are employed to deliver the scheme of work in the most effective way to meet the needs of the children. Please refer to the Teaching and Learning policy for further guidance.

Section 9: Assessment, Recording and Reporting

Science assessment is integral to the planning of work. Assessments, whether they are formative or summative, should help pupils to learn and are used to inform the teacher for future planning. Assessments may be based on observation, participation and written outcomes.

End of unit assessments are also used to establish knowledge content and the ability to apply such.

Class records are passed onto the next teacher at the end of the academic year. Parents receive an annual written report detailing their child's achievement in and understanding of Science.

Section 10: Monitoring and Evaluation

The Science subject leader will monitor and evaluate the teaching and learning of Science using the prescribed methods in the School Self-Evaluation policy and according to the Annual Schedule for Monitoring and Evaluation. The SSE process will support the formation of a subsequent SDP action plan.

School Development Plan

An action plan, drawn up by the Science Subject Leader for each school year, will contribute to the school development plan.

Section 11: Health and Safety

For safe practice in Science, please refer to the ASE Be safe! Booklet, recommended by the LEA. Teachers will promote a safe working environment in accordance with the Health and Safety policy.

This policy was written by the Science Co-ordinator following discussions with the teaching and support staff at Dorridge Primary School.

The policy will be reviewed again in September 2017.

Section 12: Appendices

Early Years Foundation Stage

Knowledge & Understanding of the World

Scale Point	
1	I can show curiosity and interest by exploring the world around me
2	I can observe, chose and move and play about with materials & objects I can identify simple features of things & important events in my life
3	I notice similarities & differences when I am exploring and observing I can construct purposefully using simple tools and techniques
4	I can investigate places, objects, materials & living things using whichever of my senses is best I can identify some features and talk about some I like/dislike - like “that’s a river; I could catch fish there”; “that’s a hill; I get tired walking up them”
5	I can ask questions about why things happen & how things work I can look closely at similarities, differences, patterns and change
6	I can find out about past and present events in my life and in the lives of my family and people I know I am beginning to know about my own special culture and beliefs and those of other people - like I know why my family don’t eat meat
7	I can find out about and identify the uses of everyday technology - like a microwave or an i-pod I can use Information and communication technology [ICT] and programmable toys to help me learn
8	I can build and construct with a wide range of objects I can chose the right resources, tools and techniques for the job and make changes if necessary
9	I can talk about simple plans for my constructions and investigations &make simple records and say why things worked well or not I can identify and name key features and properties, sometimes I link different experiences, observations and events I am beginning to explore what it means to belong to variety of groups and communities

Key stage 1 programme of study – years 1 and 2

Working scientifically

Statutory requirements

During years 1 and 2, pupils should be taught to use the following practical scientific methods,

processes and skills through the teaching of the programme of study content:

- asking simple questions and recognising that they can be answered in different ways
- observing closely, using simple equipment
- performing simple tests
- identifying and classifying
- using their observations and ideas to suggest answers to questions
- gathering and recording data to help in answering questions.

Year 1 programme of study

Plants

Statutory requirements

Pupils should be taught to:

- 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, including humans

Statutory requirements

Pupils should be taught to:

- 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

Statutory requirements

- 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

Statutory requirements

Pupils should be taught to:

- 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 changes

Statutory requirements

Pupils should be taught to:

- observe changes across the four seasons

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

Year 2 programme of study

Living things and their habitats

Statutory requirements

Pupils should be taught to:

- 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

Statutory requirements

Pupils should be taught to:

- 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

Statutory requirements

Pupils should be taught to:

- 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

Statutory requirements

Pupils should be taught to:

- 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.

Lower key stage 2 programme of study

Working scientifically

Statutory requirements

During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- asking relevant questions and using different types of scientific enquiries to answer them
- setting up simple practical enquiries, comparative and fair tests
- making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- identifying differences, similarities or changes related to simple scientific ideas and processes
- using straightforward scientific evidence to answer questions or to support their findings.

Year 3 programme of study

Plants

Statutory requirements

Pupils should be taught to:

- 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

Statutory requirements

Pupils should be taught to:

- 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

Statutory requirements

Pupils should be taught to:

- 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.

Light

Statutory requirements

Pupils should be taught to:

- 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 an opaque object
- find patterns in the way that the size of shadows change.

Forces and magnets

Statutory requirements

Pupils should be taught to:

- 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 programme of study

Living things and their habitats

Statutory requirements

Pupils should be taught to:

- 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

Statutory requirements

Pupils should be taught to:

- 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

Statutory requirements

Pupils should be taught to:

- 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

Statutory requirements

Pupils should be taught to:

- 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

Statutory requirements

Pupils should be taught to:

- 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.

Upper key stage 2 – years 5 and 6

Upper key stage 2 programme of study

Working scientifically

Statutory requirements

During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs

- using test results to make predictions to set up further comparative and fair tests
- reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations
- identifying scientific evidence that has been used to support or refute ideas or arguments.

Year 5 programme of study

Living things and their habitats

Statutory requirements

Pupils should be taught to:

- 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

Statutory requirements

Pupils should be taught to:

- describe the changes as humans develop to old age.

Properties and changes of materials

Statutory requirements

Pupils should be taught to:

- 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

Statutory requirements

Pupils should be taught to:

- 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

Statutory requirements

Pupils should be taught to:

- 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 programme of study

Living things and their habitats

Statutory requirements

Pupils should be taught to:

- 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

Statutory requirements

Pupils should be taught to:

- 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

Statutory requirements

Pupils should be taught to:

- 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

Statutory requirements

Pupils should be taught to:

- 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

Statutory requirements

Pupils should be taught to:

- 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.