



Everyone **S**miles **H**ere.
Esh Church of England Primary School.

ESH
Church of England
Primary School.

Science Policy

January 2022

Why is this area of learning important?

Science is a way of working that allows children, through practical first-hand experiences and secondary sources, to develop their knowledge and understanding of the world in which they live. These experiences should enable children to observe, question, investigate, make sense of and communicate and evaluate their findings.

Science makes an increasing contribution to all aspects of life. Children are naturally fascinated by everything in the world around them and Science makes a valuable contribution to their understanding.

Children learn by playing with things in their world. They pick up clues about what they see, touch, smell, taste and hear in order to make sense of it all. Eventually they come to conclusions which they match up with all the experiences they have had.

Teachers and parents/carers can help children to take a second, careful look at the world. By talking together children can be encouraged to explore and observe so that they can group objects and events and look for similarities and differences. They will need to measure and record the things they have found out in ways that make sense to them so that later they can talk to other people about what they have discovered. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

Aims

To encourage children to:

- develop a questioning and reflective mind by providing a range of exciting and enjoyable activities.
- develop a systematic and logical way of working.
- apply their skills and knowledge to investigative work.
- come to a deepening understanding of scientific concepts.
- work safely and carefully
- 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.

Teaching and learning

The school uses a variety of teaching and learning styles in science lessons. Our principal aim is to develop the children's knowledge, skills and understanding. We do this through a mixture of whole-class teaching and individual / group activities. Teachers encourage the children to ask as well as answer scientific questions. The children have the opportunity to use a variety of secondary sources of information, where it will enhance learning as well as gaining first hand experiences, for example, the use of books, photographs, graphs, diagrams, models and ICT.

Curriculum planning

The school follows the National Curriculum as the basis for its curriculum planning as well as suggested activities from the LA. We carry out the curriculum planning in Science in two phases (long-term and medium term).

Our long-term Science plan shows how teaching units are distributed across the year groups and how these fit together to ensure progression within the curriculum plan. These units are planned through our two year rolling program of work to ensure that every child has access to the same science experiences. The science subject leader is responsible for reviewing these plans.

Our medium-term plans give details of each unit of work for each term. They identify the key learning objectives which will be covered in that particular unit of work. The class teachers are responsible for writing the medium-term plans with the Science component of each lesson. These daily plans list the specific learning objectives of each lesson, as well as identifying the skills and progression that occurs in each topic of learning, as well as in individual lessons. The class teacher keeps these individual plans and the science subject leader may discuss them on an informal basis.

Intent

At Esh Church of England Primary School, we want our pupils to develop their understanding of the wider world: noticing trends, changes, patterns, similarities and differences. We want to promote pupils' inquisitiveness and interest in Science, using a carefully structured curriculum that allows pupils to take part in discussions to ask and answer questions. Each topic allows the harnessing of knowledge and the embedding of skills which pupils will take with them as they move into different year groups, and adulthood. Pupils use frequent practical investigations to help generate these skills and knowledge, using observation skills and scientific enquiry to unravel misconceptions, solve problems and promote a love of learning.

As part of our Intent, we want our pupils to discover new learning and facts, not just taught it. Or science

- Develop secure understanding
- Prepare pupils for transition between year groups and secondary school
- First hand practical experiences
- Address misconceptions
- Develop their ability to work scientifically, asking questions and finding the answers.
- Working towards open ended testing with children deciding on variables

Implementation

Due to our two year programme of study, long term planning is carefully prepared to ensure that coverage of each topic is implemented during the appropriate time. This is to minimise the duration of time between pupil's learning of a particular topic of study, as they progress through year groups and classes. These include topics such as **Living Things and their Habitats** and **Animals, including Humans** which are taught each year, so

that pupils can continuously build upon prior knowledge and maintain a high level of attainment. Furthermore, we have also taken careful consideration to other topics that require observations over time, such as **Seasonal changes, Plants, and Living Things and their Habitats**. Pupils will have the opportunity to draw on a range of different clues throughout the year, learning how weather changes and how this affects living things, be it animals and their habitats, or plant changes and appearance.

Where appropriate and as frequently as possible, teachers provide a wide range of hands-on activities for pupils to engage in. Through first-hand experiences, we believe pupils will become:

- greatly enthused and immersed in the learning process
- develop a love of science that could last a lifetime
- begin to develop critical thinking to find answers

Lessons include 'mini' experiments to find out how the wider world works and find patterns / changes / comparisons and results. We also include focussed experiments which run across a series of lessons, with emphasis on those on upper Key Stage 2 choosing their own variables and open ended experiments.

Esh Church of England Primary School uses a 'cover sheet' at the beginning of each unit of learning, which is found in each pupil's science book / learning journal. These contain 'I can' statements detailing what pupils will be learning in each topic, as well as showing progression. They also contain an assessment question that summarises the overall topic of learning, which is used and shared with pupils at the launch of the unit of study.

Electricity – Would a plastic paper clip make an effective switch to light a bulb?

The intention of these assessment questions is to help teachers form both a formative and summative assessment of an individual pupil's learning, alerting us to any gaps in learning and opportunities for intervention. We also use these cover sheets to actively engage pupils in their learning, gauging what they know about the topic and if they feel enabled to answer the assessment questions during any point of their study of the topic. Pupils can see what progress they are making, what they need to work on, and also begin to form building blocks of understanding that will lead them to ultimately be able to answer the overall assessment question confidently.

These 'cover sheets' also provide a list of the key vocabulary that is used throughout a topic of study. Teachers teach their pupils what each term means, and encourages them to apply these to their own scientific explanations, both verbally and written. Esh Church of England Primary School believe that pupils should be familiar and build up an extended specialist vocabulary accurately.

Skills:


- Giving our children an understanding of scientific processes.
- Helping our children to acquire practical scientific skills.
- Developing the skills of investigation - including observing, measuring, predicting, hypothesising, experimenting, communicating, interpreting, explaining and evaluating.
- Developing the use of scientific language, recording and techniques.

Impact

Impact Through the teaching of Science, children gain a knowledge and awareness of the world around them. By regularly timetabling Science each week the pupils' achievement can progress and be regularly monitored and assessed. Impact can be measured through end of Topic Assessments, Classroom Monitor records and Teacher Evaluations. Science Week also helps to raise the subjects profile within the School.

Recap

At the beginning of each topic for classes 2, 3 and 4, we recap and consolidate on a pupils learning. In order for pupils to understand what they have learned prior, and how this fits into their new learning, we look at how the topic links with objective previously taught in different years. For an example, here is the national curriculum objectives for Year 4 'States of Matter', and highlighted are where some of the most recent prior learning took place, which was in Class 2 'Uses of Everyday Materials'.

	Year	4	Topic	States of matter
	<ul style="list-style-type: none"> • 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. 			

Prior learning	Future learning
<ul style="list-style-type: none"> • Distinguish between an object and the material from which it is made. (Y1 - Everyday materials) • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials) • Describe the simple physical properties of a variety of everyday materials. (Y1 - Everyday materials) • Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - 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. (Y2 - Uses of everyday materials) • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials) 	<ul style="list-style-type: none"> • 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. (Y5 - Properties and changes of materials) • Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. (Y5 - Properties and changes of materials) • Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. (Y5 - Properties and changes of materials) • Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. (Y5 - Properties and changes of materials) • Demonstrate that dissolving, mixing and changes of state are reversible changes. (Y5 - Properties and changes of materials) • 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. (Y5 - Properties and changes of materials)

We then begin our new unit by asking a series of questions to help pupils recap on their learning and retain information that will help them form a well-rounded understanding.



States of Matter (Class 2 Every Day Materials recap)



1. Which material is best suited for making a house? Tick the correct option



2. Plastic bottles are made to be see-through. What do we call something that you can see--through?

.....

3. What other property does a water bottle need?

.....

4. What is this material and what could we make using it?



.....


.....

5. Which of these items can be bent AND squeezed? Tick the correct option(s)




We use a range of multi-choice questions and visual stimuli to help pupils remember teaching that might have occurred at least a year ago or longer.

To further embed learning, we also begin every lesson with a 'Recap and consolidate', which involves a series of questions revolving around a pupil's learning in the previous lesson. Again, this helps to remind pupils of what they had learned the week before, and how it fits in to their learning for the current week. Any misconceptions can then be instantly addressed before moving on to their next lesson. The recaps are effective for both formative and summative assessment.






Recap and consolidate




1. What is a closed circuit?

2. Which of these are conductors? Tick the correct picture(s)

3. What is symbol? Is it open or closed?



Early Years and Foundation Stage

We teach science in the Foundation stage as an integral part of the topic work covered during the year. Children must be supported in developing the knowledge, skills and understanding that help them to make sense of the world. Their learning must be supported through offering opportunities for them to use a range of tools safely; encounter creatures, people, plants and objects in their natural environments and in real-life situations; undertake practical 'experiments'; and work with a range of materials

Class 1

Pupils should be taught to:

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 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 Changes

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

Class 2

Pupils should be taught to:

All 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.

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.
- Identify that humans and some other animals have skeletons and muscles for support, protection and movement.

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

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.

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.

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

Class 3

Pupils should be taught to:

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

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 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.

Animals, including humans

- Describe the changes as humans develop to old age.

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.

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.

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.

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.

Class 4

Pupils should be taught to:

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

- 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 must always be taught through and clearly related to the programme of study. Pupils at Esh C of E learn to use a variety of approaches to answer relevant scientific questions by collecting, analysing and presenting their findings.

Children will use different types of enquiry throughout each year:

- Observe over time
- Classifying and grouping
- Pattern seeking
- Comparative and fair test
- Research and secondary sources

Through this approach we aim to develop the following skills: observing, raising questions, predicting, hypothesising, planning, controlling factors (fair testing), measuring, collecting and interpreting data, constructing tables and graphs, explaining, communicating and evaluating findings, researching information.

Entitlement

Inclusion and SEN

At Esh C.E. Primary School, we teach Science to all children, whatever their ability and individual needs. This is in line with the school's curriculum policy of providing a broad and balanced education to all children. Through our Science teaching, we provide learning opportunities that enable all pupils to make good progress.

We strive to meet the needs of those pupils with special educational needs, those with disabilities, those with special gifts and talents, and those learning English as an additional language, and we take all reasonable steps to achieve this. For further details, see the relevant SEN, Pupil Premium and More Able policies.

Opportunities for wider development are provided wherever possible, for example, extra-curricular clubs and links with local high schools.

Assessment, Recording and Reporting

Our Assessment procedures provide an all-round picture of individual children's attainment and achievement and a review of how the curriculum is implemented. The outcomes of our assessment procedures are effectively recorded and determines future planning. Children are assessed on the 'I can...' statements which are organised into the different areas of the Science curriculum. To launch a new topic of learning, we introduce an assessment question which covers the overall arc of learning which will be taught. With this, we are able to initially gauge children's understanding and then lead them to gain the insight, understanding and confidence to answer this assessment question at the end of the topic. At the end of each unit of work, the class teacher will assess the children on their learning, both to individual learning objectives from the national curriculum, skills embedded, and the overall understanding of the topic of study. They will make a note of who in the class is working at, above or below age related expectations. These assessments will be passed on to the Science Co-ordinator and the next class teacher at the end of the year.

Evidence of Science in school is saved in a different formats. In EYFS and Year 1, a range of evidence is seen in individual topic books. Pupils in Years 2 -6 have their own individual science books. However, in all classes, teachers use the same uniformed assessment sheets which contain all of the learning objectives, as well as detailed progression that shows what strands children have achieved. This in turn, details what aspects of the curriculum need to be consolidated so that teachers can take steps to 'bridge the gap' in children's understanding.

Information about each pupil's achievements and experiences in Science are reported to parents on the end of year report.

Health and Safety

It is important that children are taught the rules of safety when undertaking experiments and investigations. Materials and equipment need to be handled sensibly and we try to ensure that children do this. It is the teacher's responsibility to make sure that all helpers (TAs, parents etc.) are aware of safety implications connected with any Science activity they are undertaking.

Subject Leader's role

The Science co-ordinator is to:

- Take lead in policy development and the implementation of the Scheme of Work.
- Support colleagues in their development of work plans, and implementation of the Scheme of Work.
- Monitor the resources in Science and advise the Head Teacher of any action needed.
- Take responsibility for the purchase and organisation of central resources for Science.
- Keep up to date with developments in Science education and disseminate information to colleagues as appropriate.
- Monitor the teaching and learning of Science throughout the school.

Staff Development

To implement our school's vision effectively, all staff need to be confident in all areas of the Science curriculum. Staff who have identified areas of development in Science will be identified and through communication between the Science co-ordinator and the Headteacher, relevant course will be located or training brought into/held at school.

The Science Co-ordinator keeps up to date with the latest practises and curriculum developments by attending conferences, network and school cluster meetings. Information is then fed back to the rest of the school during staff meetings.

Science coordinating leading staff training.

Science Leader: Mr A Musgrove

Policy review date: January 2024

Mr A Park

(Headteacher)