



ST.BEDE'S R.C.V.A PRIMARY SCHOOL

St Bede's is a community
Of faith, love and respect
Inspiring us to achieve

Science Policy

Policy Dated- January 2018

Adopted by St Bede's Governing Body

Date next reviewed- January 2020

Headteacher Signed- T Worrall

Chair of Governors Signed- S.Legge

Statement of intent

Science provides the foundation for understanding the world around us. It can not only teach pupils about the world they live in, but also how to study it and make sense of various phenomena. Science provides a methodology for explaining, making predictions about and analysing natural phenomenon. As such, it is a fundamental aspect of all children's learning.

Through adherence to this policy St Bede's RC Primary School will not only ensure statutory compliance with the National Curriculum, but also that all pupils have a solid grounding in science and a positive attitude towards scientific knowledge and experimental processes.

1. Introduction and aims

- 1.1. Science is about making sense of the world in which we live through investigation and the experimental testing of ideas. As a methodology, as well as a subject, science involves systematic investigation of the physical, chemical and biological aspects of the world.
- 1.2. The aims of this policy include:
 - Developing pupils' interest in and enjoyment of science. By building on children's curiosity, the science curriculum will help instil a positive attitude towards science in pupils.
 - Delivering all the requirements of the National Curriculum in relation to science and covering major scientific concepts.
 - Ensuring science lessons are purposeful, accurate and imaginative.
 - Ensuring pupils have sufficient scientific knowledge to understand both the uses and implications of science, today and in the future. This will also give students an appreciation of the changing nature of scientific knowledge.
 - The development of pupils' ability to pose questions, investigate these using correct techniques, accurately record their findings using appropriate scientific language and analyse their results.
 - Helping pupils develop the skills of prediction, hypothesising, experimentation, investigation, observation, measurement, interpretation and communication.
 - Making pupils aware of and alert to links between science and other school subjects, as well as their lives more generally.
- 1.3. This policy will be reviewed every two years.

2. The National Curriculum

- 2.1. DfE guidance outlines a number of requirements regarding school science. These are included within this section.
- 2.2. During years 1 and 2, pupils should be taught to:
- Ask simple questions and recognise that they can be answered in different ways.
 - Observe closely, using simple equipment.
 - Perform simple tests.
 - Identify and classify.
 - Use their observations and ideas to suggest answers to questions.
- 2.3. During years 3 and 4, pupils should be taught to:
- Ask relevant questions and use different types of scientific enquiries to answer these questions, setting up simple practical enquiries, comparative and fair tests.
 - Make systematic and careful observations and, where appropriate, take accurate measurements using standard units and a range of equipment, including thermometers and data loggers.
 - Gather, record, present and classify data in a variety of ways to help answer questions.
 - Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables.
 - Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.
 - Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.
 - Identify differences, similarities or changes related to simple scientific ideas and processes.
 - Use straightforward scientific evidence to answer questions or to support their findings.
- 2.4. During years 5 and 6, pupils should be taught to:
- Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.
 - Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.
 - Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.
 - Use test results to make predictions to set up further comparative and fair tests.
 - Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results. This should be in oral and written forms such as displays and other presentations.
 - Identify scientific evidence that has been used to support or refute ideas or arguments.

2.5. In more comprehensive guidance, the DfE also breaks down what is required at each year level by topic. Details of these requirements are outlined below.

2.6. Year One:

2.6.1. 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.

2.6.2. Animals

- 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.

2.4.3. 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.

2.4.4. Seasonal change

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

2.5. Year Two:

2.5.1. Living things and their habitat

- 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.

2.5.2. 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.

2.5.3. Animals

- 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.

2.5.4. 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.

2.6. Year Three:

2.6.1. 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.

2.6.2. Animals

- 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.

2.6.2. 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.

2.6.3. 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 sizes of shadows change.

2.6.4. 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.

2.7. Year Four:

2.7.1. 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.

2.7.2. Animals

- Recognise that environments can change and that this can sometimes pose dangers to living things.
- 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.

2.7.3. 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.

2.7.4. 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.

2.7.5. 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.

2.8. Year Five:

2.8.1. 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.

2.8.2. Animals

- Describe the changes as humans develop to old age.

2.8.3. 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.

2.8.4. 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.

2.8.5. 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, which act between moving surfaces.
- Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.

2.9. Year Six:

2.9.1. 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.

2.9.2. Animals

- 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.

2.9.3. Evolutions 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.

2.9.4. 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.

2.9.5. 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.

3. Planning and teaching

3.1. **Differentiation and additional educational needs**

Science lessons will be planned to ensure a range of different activities for pupils to engage with. Activities will take into account the abilities of all pupils, as well as their age.

Where pupils display a high level of academic aptitude, there will be a concerted effort to ensure that they are challenged by the material and activities covered.

In addition to this, the specific needs of pupils with special educational needs and disabilities (SEN) will also be taken into account and extra support will be provided, or adjustments made to lesson plans in order to accommodate their needs.

Care will be taken when grouping pupils for practical experiments to ensure that group dynamics are functional and productive and that the strengths and weaknesses of the individual pupils are taken into account.

3.2. **Breadth and balance**

Thorough and balanced content will be used to ensure coverage of the new National Curriculum. Topics will be carefully chosen and scheduled to ensure comprehensive coverage of all learning objectives and to ensure progression through the various topics builds on pupils' previous knowledge. This will be a focus for all science staff, including those in a supportive role. It is important that all staff members are up-to-date with learning objectives under the New Curriculum and clearly understand the skills and concepts pupils need to become familiar with.

Staff should familiarise themselves with both learning objectives and the attainment targets, particularly attainment targets one and two which have a fifty and forty percent weighting at Key Stages One and Two respectively. With this in mind, Key Stages One, Two and the Foundation Stage should be taught for at least two hours per week. At Key Stage One, at least a third of lessons should involve some kind of practical scientific investigation with this rising to 50% at Key Stage Two.

4. Learning environment

4.1. To assist with learning, all lessons should have clear learning objectives which are effectively communicated to students at the beginning of the lesson.

4.2. A variety of learning strategies should be employed in the classroom to help keep all pupils engaged and inspire them to want to investigate the world around them. This should include group discussions, presentations, demonstrations, practical explanations, experimental work and instruction from the teacher, as well as child-led instruction where this is possible and appropriate.

4.3. Activities should focus on developing pupils' ability to enquire, observe, locate sources of information, plan investigations, select appropriate equipment and

use this safely, measure and record results, analyse and communicate findings.

- 4.4. The classroom should display items which are visually appealing and relevant to science.
- 4.5. A variety of resources should be available in the classroom (whether at all times or for specific lessons) which pupils' can use to engage them with different aspects of science.
- 4.6. Lessons should make links to other school subjects and the natural world generally, including aspects of pupils' own lives.
- 4.7. A variety of strategies should also be used to assess the progress of pupils. These should include: questions, discussion, marking and portfolios.
- 4.8. Lessons should make links to other areas of schooling.

5. Assessment and recording

- 5.1. At Key Stage One, teacher assessment will take precedent. The progress and attainment levels of all pupils will be recorded and examples of work should be held in portfolios. This should monitor the subject knowledge of students as well as their ability to carry out scientific investigations.
- 5.2. By Key Stage Two, this same recording process should also account for end of topic assessment scores. These test pupils' knowledge and vocabulary.
- 5.3. Written reports to parents will be provided during the summer term every year. These will include information on the pupil's attitude towards science, progress in understanding scientific method, ability to investigate, and the knowledge levels they have achieved. Verbal reports will be provided at parent-teacher interviews during the Autumn and Spring terms.

6. The subject leader

- 6.1. The Subject Leader will have a number of responsibilities, including for:
- 6.2. **Professional leadership and management**
This means ensuring professional leadership and management is properly managed and organised, ensuring that it meets the school's objectives.
- 6.3. **Teaching and learning**
The subject leader will monitor teaching and learning and initiate reviews of the scheme of work.
- 6.4. **Resources**
This entails managing resources and maintaining stock to meet curriculum needs.

7. Health and safety

- 7.1. Teachers must carefully plan lessons to ensure any experiments comply with all school Health and Safety procedures.
- 7.2. A risk assessment should be completed and provided to the Science Lead before experiments are carried out.

- 7.3. Any 'new' experiments which a teacher has not used in class before should be trialled prior to being performed with pupils in class time.
- 7.4. At the beginning of any experiments, the teacher should outline the purpose of the experiment to the class and all hazards and safety precautions must be thoroughly outlined.
- 7.5. Risk assessment forms/cards should be kept with the relevant resources and equipment.
- 7.6. Equipment should be checked regularly by the subject coordinator and any damages or defects should be reported to the subject coordinator. Equipment which is of concern should be removed from the general store immediately.

8. Equal opportunities

- 8.1. All pupils are to have equal access to the entire science curriculum, including practical experiments.
- 8.2. Gender, learning ability, physical ability, ethnicity, linguistic ability and/or cultural circumstances will not impede pupils from accessing all science lessons. Where it is inappropriate for a pupil to participate in a lesson because of reasons related to any of these factors, the lessons will be adapted to meet the pupils' needs and alternative arrangements involving extra support will be provided where necessary.
- 8.3. All efforts will be made to ensure that cultural and gender differences will be positively reflected in all lessons and teaching materials used.

9. Science and the core curriculum

- 9.1. Because science is such an important aspect of learning to our everyday lives, the links between science and other subject areas will be emphasised:
- 9.2. **History:**
The contributions men and women of various cultures have made to science will be studied.
- 9.3. **Literacy:**
Literacy will be developed through pupils' written and spoken work. This will include describing what they are observing, planning what to do next and drawing conclusions based on their experiments.
- 9.4. **Mathematics:**
Science will involve a degree of numeracy at all levels, from measurements and data recording to more complex equations.
- 9.5. **ICT:**
ICT will be an important area of the science curriculum, particularly with regard to data collection and monitoring. Software, such as Microsoft Excel, will be used to record findings and make graphs and tables of these. Pupils will also use calculators and, where appropriate, cameras, to record their experiments and findings.

9.6. **Spiritual development:**

This aspect of pupils' development will be furthered by focussing on the vastness of science, and encouraging a sense of awe and wonder about the natural world. Where appropriate, current scientific developments and issues will be raised within the classroom.

9.7. **Health and wellbeing:**

Health education will be incorporated into science lessons which focus on the human body, life cycles and other areas of biology.