ST. JOSEPH'S CATHOLIC PRIMARY SCHOOL

SCIENCE POLICY

Reviewed: FEBRUARY 2023
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St Joseph's Catholic Primary School
Science Policy

Document Purpose

This document outlines the school's philosophy with regard to the teaching and learning of Science.

Overview

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.
National Curriculum for England, Science, 2014

Science stimulates curiosity and excites pupils to ask questions about the world in which we live. Practical experiences enhance children's knowledge and understanding of the world and make important necessary links in everyday life. Through science children learn to question, reason and discuss topical science-based issues and make informed decisions about why things happen. They explore meaningful ideas in context to develop an understanding of issues affecting their lives and the future of the world. Furthermore, it brings relevance, interest and purpose to their learning. Through investigations children develop numerous essential life skills as well as satisfying their curiosity and overcoming misconceptions. It provides strong links with all aspects of learning contributing to a broad and balanced curriculum.
Science teaching provides creative, practical, skill based, cross curricular learning that is highly significant to children's experiences.

Objectives

- To develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics.
- To 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.
- To equip children with the scientific knowledge required to understand the uses and implications of science, today and for the future.

- To develop an enquiring mind and willingness to ask questions about the natural world.
- To develop knowledge and understanding of science which will serve as a foundation for future enquiry.
- To develop attitudes which promote scientific thinking including, open mindedness, objectivity and the value of team work.
- To enhance and develop scientific enquiry skills including; predicting, testing, devising fair tests, planning investigations, leading controlled experiments, drawing conclusions, evaluating validity of results and making generalisations.
- To develop recording skills in a variety of formats e.g. writing, illustrations, graphs, tables and charts.
- To stimulate and enhance children's love of learning and encourage children to find enjoyment and satisfaction in their work.
- To ensure cross curricular links are made to develop a sense of purpose and achievement.
- To celebrate and value the contribution that all children make and share their achievements with others.
- To create links to first hand experiences to ensure learning is meaningful and set in context.

Strategies

- In the Foundation Stage children will begin developing their knowledge and understanding of the world. They will explore a variety scientific aspects and ask many questions about the world around them. Teachers will use the Foundation Stage Profile and Early Learning Goals to plan relevant experiences for the children.
- In KS1 and KS2 science will be taught every week.
- Teachers will fulfil the requirements of the National Curriculum at Key Stage 1 and 2 covering all aspects of the relevant topics, scientific knowledge and conceptual understanding, the nature, processes and methods of science, spoken language and the key phase requirements for working scientifically.
- Teachers will develop pupil's scientific vocabulary and ability to articulate scientific concepts clearly and precisely.
- Teachers will use the National Curriculum objectives, requirements and guidance to plan science lessons and draw on the extensive resources available in school.
- Teachers will teach science through a question based approach and draw on the materials from Clive Davies where appropriate.
- The teacher will stimulate children's curiosity about aspects of science to develop an enquiring mind and encourage children to question, reason and discuss.
- Children will be encouraged to plan their own fair test investigations identifying variables, what will stay the same, observations and measurements and forming questions.
- Children will be encouraged to make links from previous enquiry and experiences to make predictions and informed decisions in their learning.

- Children will learn to record their work in a variety of formats e.g. bar, line graphs, tables, illustrations and writing.
- Children will be encouraged to self and peer assess their work. They will also be involved in planning the next stage in their learning, discussing where they think that are at and where they need to go next.
- Teachers will assess pupil's progress for each of the topics, this will be recorded after every topic. Children will be given the judgement, emerging, met or exceeded for each topic.
- Teachers will also formatively assess children's learning on a weekly basis and use this information to inform planning to provide relevant learning experiences for the children tailored to their individual learning needs.

Community Cohesion

We will endeavour to develop community cohesion i.e. binding the community together by thinking about areas such as rights and responsibilities, mutual respect for one another, equality servility etc. whenever appropriate.

Inclusion and equal opportunities

As a school we recognise that we have children of differing abilities in all our classes and we provide suitable learning opportunities for all children by matching the challenge of the task to the ability of the child. We achieve this through a range of strategies;

- Setting tasks of increasing difficulty, where not all children complete all tasks.
- Providing resources from earlier of later key stages to support or enhance learning.
- Providing relevant challenges for more able pupils to advance their learning.
- Having additional adults to support the work of individual children or small groups.
- Presenting children with both open and closed questions targeted at all abilities to allow all children to reach their full potential.
- Providing work with equal appeal to boys and girls.

Inclusion

To ensure the inclusion of those with specific difficulties; the following approaches are adopted:

- Modification of activities where necessary.
- Parallel activities - all pupils take part in the same activity but in different ways.
- Included activities - all pupils play adapted games specifically designed to meet everyone's needs.
- Separate activities - where it is difficult for a pupil with special needs to take part.

Assessment

Each term children are assessed using the Lancashire 'Key Learning in Science document' and assessments are recorded on assessment grid. (***See Appendix 1***). TAP's documents and Knowledge Matrices are used to support the teachers judgments.

From this assessment the Science Leader looks at each classes data and works out the percentages of children working at the Expected level, the children working Above the Expected level and children who are working Below the Expected level. Percentages and target groups are then filled in on a Whole School Data form. (***See Appendix 2a & 2b***)

Forest School

St Joseph's has recently built an 'Outdoor Forest School' environment in which all classes can access at different stages during the week to develop outdoor learning and build their awareness of the greater outdoors. There are two members of school staff that have been professionally trained to be forest school's leaders and are also outdoor first aid trained.
(Outdoor Classroom with a fire pit, Pond, den building area)

Outcomes

Science will be fun and enjoyable and stimulate pupils' curiosity and willingness to learn. It will have a strong presence in the ethos of the school through displays and science weeks.

Key Learning in Science: Year 4

Appendix 1

Please Note: There should be plenty of opportunities throughout the year for children to use the school/local environment to observe and identify how a habitat changes. This could include a focus on the relationships between the plants and animals within a habitat. This could be done through an ongoing/monthly nature journal to observe, record and review over a period of time.

Environment – Living Things and Their Habitats

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.
  - Use and make identification keys for plants and animals.

Notes and Guidance (non-statutory):

Pupils should use the local environment throughout the year to raise and answer questions that help them to identify and study plants and animals in their habitat. They should identify how the habitat changes throughout the year. Pupils should explore possible ways of grouping a wide selection of living things that include animals and flowering plants and non-flowering plants, Pupils could begin to put vertebrate animals into groups such as fish, amphibians, reptiles, birds, and mammals; and invertebrates into snails and slugs, worms, spiders, and insects.

Note: Plants can be grouped into categories such as flowering plants (including grasses) and non-flowering plants, such as ferns and mosses.

Pupils should explore examples of human impact (both positive and negative) on environments, for example, the positive effects of nature reserves, ecologically planned parks or garden ponds, and the negative effects of population and development, litter or deforestation.

Pupils might work scientifically by:

- **Using and making simple guides or keys [grouping & classifying]** to explore and identify local plants and animals.
- **Making a guide [grouping & classifying]** to local living things.
- **Raising and answering questions** based on their **observations** of animals and
- What they have found out about other animals that they have **researched**.

Animals – Teeth, Eating and Digestion

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 *(NB Link with types of teeth and eating in this unit but this concept could be developed further in the yr4 Environment / habitats unit).*
  - Describe how teeth and gums have to be cared for in order to keep them healthy.

Notes and Guidance (non-statutory):

Pupils should be introduced to the main body parts associated with the digestive system, for example, mouth, tongue, teeth, oesophagus, stomach and small and large intestine and explore questions that help them understand their special functions.

Pupils might work scientifically by:

- **Comparing** the teeth of carnivores and herbivores.
- **Suggesting reasons** for differences **[grouping & classifying]**.
- **Finding out [testing and/or researching]** what damages teeth and how to look after them.
- **Drawing and discussing their ideas** about the digestive system.
- **Comparing** them with …
- **… models** or images.

Material Properties and Changes – States of Matter

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.
  - Solids, liquids and gases can be identified by their observable properties.
  - Solids have a fixed size and shape (the size and shape can be changed but it remains the same after the action).
  - Liquids can pour and take the shape of the container in which they are put.
  - Liquids form a pool not a pile.
  - Solids in the form of powders can pour as if they were liquids but make a pile not a pool.
  - Gases fill the container in which they are put.
  - Gases escape from an unsealed container.
  - Gases can be made smaller by squeezing/pressure.
  - Liquids and gases can flow.

Notes and Guidance (non-statutory):

Pupils should explore a variety of everyday materials and develop simple descriptions of the states of matter (solids hold their shape; liquids form a pool not a pile; gases escape from an unsealed container). Pupils should observe water as a solid, a liquid and a gas and should note the changes to water when it is heated or cooled.
Note: Teachers should avoid using materials where heating is associated with chemical change, e.g. through baking or burning.

Pupils might work scientifically by:

- **Grouping and classifying** a variety of different materials.
- **Exploring** the effect of temperature on substances such as chocolate, butter, cream (for example, to make food such as chocolate crispy cakes and ice-cream for a party).
- **Researching** the temperature at which materials change state, for example, when iron melts or when oxygen condenses into a liquid.
- **Observing** and **recording** evaporation over a period of time, such as a puddle in the playground or washing on a line.
- **Investigating** the effect of temperature on washing drying or snowmen melting.

Additional suggestion from Lancashire for working scientifically opportunities which enhance learning and support using ICT.

- This unit provides an ideal opportunity for **using data logging equipment** to detect/measure and compare temperatures.

Sound

Pupils should be taught to:

Vibrations

- 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 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.
  - Recognise that sounds can be made in a variety of ways (pluck, bang, shake, blow) using a variety of things (instruments, everyday materials, body).
  - Sounds travel away from their source in all directions.
  - Vibrations may not always be visible to the naked eye.

Pitch

- Find patterns between the pitch of a sound and features of the object that produced it.
  - Sounds can be high or low pitched.
  - The pitch of a sound can be altered.
  - Pitch can be altered either by changing the material, tension, thickness or length of vibrating objects or changing the length of a vibrating air column.

Muffling/blocking sounds

- Recognise that vibrations from sounds travel through a medium to the ear.
  - Sounds are heard when they enter our ears (although the structure of the ear is not important key learning at this age phase).
  - Sounds can travel through solids, liquids and air/gas by making the materials vibrate.
  - Sound travel can be reduced by changing the material that the vibrations travel through.
  - Sound travel can be blocked.

Notes and Guidance (non-statutory):

Pupils should explore and identify the way sound is made through vibration in a range of different musical instruments from around the world; and find out how the pitch and volume of sounds can be changed in a variety of ways.

Pupils might work scientifically by:

- **Finding patterns** in the sounds that are made by different objects such as saucepan lids of different sizes or elastic bands of different thicknesses.
- They might make ear muffs from a variety of different materials **to investigate /test** which provides the best insulation against sound.
- They could **make [create/invent/design]** and play their own instruments by **using what they have found out** about pitch and volume.

Additional suggestion from Lancashire for working scientifically opportunities which enhance learning and support using ICT across the curriculum

- This unit provides an ideal opportunity for **using data logging equipment** to detect/measure and compare sounds.

Electricity

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.
  - Electricity can be dangerous.
  - Electricity sources can be mains or battery.
  - Batteries 'push' electricity round a circuit and can make bulbs, buzzers and motors work.
  - Faults in circuits can be found by methodically testing connections.
  - Drawings, photographs and diagrams can be used to represent circuits (although standard symbols need not be introduced until UKS2).

Notes and Guidance (non-statutory):

Pupils should construct simple series circuits, trying different components, for example, bulbs, buzzers and motors, and including switches, and use their circuits to create simple devices. Pupils should draw the circuit as a pictorial representation, not necessarily using conventional circuit symbols at this stage; these will be introduced in Year 6.
Note: Pupils might use the terms current and voltage, but these should not be introduced or defined formally at this stage. Pupils should be taught about precautions for working safely with electricity.

Pupils might work scientifically by:

- **Observing/noticing patterns**, for example, that bulbs get brighter if more cells are added, that metals tend to be conductors of electricity, and that some materials can and some cannot be used to connect across a gap in a circuit.

Exploring / Observing *LKS2 - developing their own ideas and their understanding of the world around them*	Grouping & Classifying *LKS2 - Compare and contrast a variety of examples linked to LKS2 PoS*	Questioning *LKS2 - asking relevant questions*	Researching *LKS2 - finding things out using a wide range of secondary sources of information*	Modelling *using dance, drama or a visual aid to represent science in the real world*	Collaborating *interacting effectively as part of a group*
▪ Suggest their own ideas on a concept and compare these with what they observe / find out. ▪ Use observations to suggest what to do next ▪ Discuss ideas and develop descriptions from their observations using relevant scientific language and vocabulary (from Y4 PoS) ▪ Observe and record relationships between structure and function or between different parts of a processes (linked to Y4 PoS) ▪ Observe and record changes /stages over time (linked to Y4 PoS)	▪ Make a simple guide to local living things. ▪ Use guides or simple keys to classify / identify [animals, flowering plants and non-flowering plants]. ▪ Use their observations to identify and classify ▪ Begin to give reasons for these similarities and differences. ▪ Record similarities as well as differences and/or changes related to simple scientific ideas or processes or more complex groups of objects/living things/events *(e.g. evaporation and condensation, different food chains, different electrical circuits).*	▪ Ask/raise their own relevant questions with increasing confidence and independence that can be explored, observed, tested or investigated further ▪ Ask questions such as 'What will happen if…?" or 'What if we changed…? (linked with Y4 PoS) ▪ Choose/select a relevant question that can be answered [by research or experiment/test].	▪ Make decisions about which information to use from a wide range of sources and make decisions about how to present their research ▪ Recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations.	▪ Make a visual representation or a model of something to represent something they have seen or a process that is difficult to see. ▪ Suggest their own ideas on a concept and compare these with models or images.	▪ Make some decisions about an idea within a group *(e.g. I think we should find out by testing…)* ▪ Increasingly support, listen to and acknowledge others in the group ▪ Build on / add to someone else's idea to improve a plan. ▪ Understand that it is okay to disagree with their peers and offer reasons for their opinion

Planning & Testing *LKS2 - making decisions about and setting up simple practical enquiries, comparative tests and fair tests*	Using Equipment & Measures *LKS2 - making accurate measurements and gathering data*	Communicating *Reporting findings, recording data, presenting findings* *Read, spell and pronounce scientific vocabulary correctly linked to the relevant Yr Grp*	Considering the results of an investigation / writing a conclusion		
			Describing results / Looking for patterns *LKS2 - Describing their findings / results*	Explaining results *LKS2 - reporting on findings saying why something happened*	Trusting results *LKS2 - suggest improvements for further tests*
▪ Carry out simple **fair tests** with increasing confidence investigating the effect of something on something else (linked to Y4 PoS). ▪ Start to make their own decisions about the most appropriate type of science enquiry they might use to answer scientific questions *(is a fair test the best way to investigate their question?).* ▪ Make a **prediction** based on the knowledge acquired from previous explorations /observations and apply it to a new situation ▪ Explain their planning decisions and	▪ Begin to identify where patterns might be found and use this to begin to identify what data to collect ▪ Make more of the decisions about what observations to make, how long to make them for and the type of equipment that might be used. ▪ Recognise obvious risks and how to keep themselves and others safe ▪ Learn how to use new equipment, such as data loggers & measure temperature in degrees Celsius (°C) using a thermometer. ▪ Collect data from their own observations and measurements, using notes/simple tables/standard **units**	▪ Record findings using relevant scientific language and vocabulary (from Y4 PoS), including discussions, oral and written explanations, notes, drawings (annotated), pictorial representations, labelled diagrams, tables and bar charts [where intervals and ranges agreed through discussion], displays or presentations ▪ Begin to select the most useful ways to collect, record, classify and present data from a range of choices ▪ Make decisions on how best to communicate their findings in ways that are appropriate for different	▪ Notice/find patterns in their observations and data. (Describe the effect of something on something else) *(e.g. as I lengthen the ruler I notice that the pitch gets lower)* ▪ With some independence, analyse results / observations by writing a sentence that matches the	▪ Begin to develop their ideas about relationships and interactions between things and explain them ▪ Use relevant scientific language and vocabulary (from Y4 PoS) to begin to say/explain *why* something happened	▪ Use results to suggest improvements, new questions and/or predictions for setting up further tests ▪ Compare their results with others and give reasons why results might be different

choices ▪ Make some of the planning decisions about what to change and measure/observe. ▪ Begin to recognise when a **fair test** is necessary.	▪ Make **accurate** measurements using standard **units** [and more complex units and parts of units] using a range of equipment and scales	audiences	**evidence** i.e. deciding the important aspect of the result and summarising in a **conclusion** *(e.g. metals tend to be good conductors of electricity)*		

Appendix 2a)

'Living life to the full'

SCIENCE ACADEMIC YEAR 2020/21

Year Group	Ahead	On track+	Below
Y3 - 15 pupils AUTUMN			
	EXCEEDING	EXPECTED	EMERGING
20% ABOVE 73% ON TRACK + 27% BELOW	0/15 (%)	0/15 (%)	0/15 (%)
Y3 - 15 pupils SPRING			
??% ABOVE ??% ON TRACK + ??% BELOW			
Y3 - 15 pupils SUMMER			
??% ABOVE ??% ON TRACK + ??% BELOW			

Appendix 2b)

ST JOSEPH'S CATHOLIC PRIMARY SCHOOL, WRIGHTINGTON
SCIENCE WHOLE SCHOOL DATA 2018-2019

Year Group	Ahead	On track	Below
RECEPTION 18 Pupils			
THE WORLD	**EXCEEDING**	**EXPECTED**	**EMERGING**
AUTUMN 2018	5/18 (28%)	16/18 (89%)	2/18 (11%)
SPRING 2019			
SUMMER 2019			
Year 1 – 16 pupils			
AUTUMN 2018	0/16 (0%)	10/16 (63%)	6/16 (37%)
SPRING 2019			
SUMMER 2019			
Year 2 – 21 pupils			
AUTUMN 2018	4/21 (19%)	16/21 (76%)	5/21 (24%)
SPRING 2019			
SUMMER 2019			
Year 3 – 12 pupils			
AUTUMN 2018	4/12 (33%)	12/12 (100%)	0/12 (0%)
SPRING 2019			
SUMMER 2019			
Year 4 – 18 pupils			
AUTUMN 2018	3/18 (17%)	13/18 (72%)	5/18 (28%)
SPRING 2019			
SUMMER 2019			
Year 5 – 27 pupils			
AUTUMN 2018	7/27 (26%)	18/27 (67%)	9/27 (33%)
SPRING 2019			
SUMMER 2019			
Year 6 – 18 pupils			
AUTUMN 2018	4/18 (22%)	16/18 (89%)	2/18 (11%)
SPRING 2019			
SUMMER 2019			