

# St. Joseph and St. Bede R. C. Primary School



## Science Policy

With **Christ** at the  
centre, our *Dream*  
is for **greatness** in our  
learning, to  
*Believe* in our  
unique talents, to be  
Guardians of  
**life & creation**  
and to *Achieve*  
**a better world, by  
living life to the full.**

Approved By:

J. Myerscough

Date: Nov 2021

Written By:

Karen Diamond

Next review due by:

November 2022

## Contents

1. Subject Statement
2. Teaching and Learning
3. Assessment
4. Planning and Resources
5. Organisation
6. EYFS
7. KS1 and KS2
8. Equal Opportunities
9. Inclusion
10. Role of the Subject Leader
11. Parents

### 1. Curriculum Statement

#### Intent

The National Curriculum for science aims to ensure that all pupils:

- 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 skills** required to understand the **uses and implications** of science, today and for the future. We understand that it is important for lessons to have a skills-based focus, and that the knowledge can be taught through this

At St. Joseph and St. Bede, we encourage children to be inquisitive throughout their time at the school and beyond. The Science curriculum fosters a healthy curiosity in children about our universe and promotes respect for the living and non-living. We believe science encompasses the acquisition of knowledge, concepts, skills and positive attitudes.

In our Science lessons, we ensure that both our pupils' substantive and disciplinary knowledge is built upon year on year. We ensure all children are exposed to high-quality science teaching and a range of learning experiences. Science teaching is carefully

sequenced to ensure a clear progression of substantive knowledge and disciplinary knowledge. Each lesson is designed to explore and build on children's prior knowledge, allowing for misconceptions to be addressed effectively.

The substantive knowledge builds progressively to develop children's understanding of concepts, models, laws and theories.

It is organised into the following four areas:

### **Biology**

- Living things and their environment
- Reproduction, inheritance and evolution

### **Chemistry**

- States of matter
- Materials (properties and changes)

### **Physics**

- Energy
- Forces

### **Earth Science**

- Earth and space

The disciplinary knowledge builds progressively to enable children to work scientifically and covers the following aspects:

- Methods used to answer questions
- Using apparatus and techniques
- Data analysis
- Using evidence to develop explanations

We design and deliver a broad and balanced science curriculum which stimulates and maintains children's natural curiosity. Key scientists, significant discoveries and theories are studied, to give the children a real-life understanding of concepts taught. Deeper thinking is encouraged through the use of a 'Big Question' in every lesson. Where possible, real-life examples are used in lessons to give our children a deeper understanding of these concepts.

Throughout the programmes of study, the children will acquire and develop the key knowledge that has been identified within each unit and across each year group, as well as the application of scientific skills. We ensure that the Working Scientifically skills are built-on and developed throughout children's time at the school so that they can apply their knowledge of science when using equipment, conducting experiments, building arguments and explaining concepts confidently and continue to ask questions and be curious about their surroundings.

## **Implementation**

Teachers create a positive attitude to science learning within their classrooms and reinforce an expectation that all pupils are capable of achieving high standards in science. Our whole school approach to the teaching and learning of science involves the following;

- Science will be taught in planned, cross-curricular, topic blocks by the class teacher, to have a broader learning approach that progresses week on week. This is a strategy to enable the achievement of a greater depth of knowledge.
- Through our planning, we involve problem solving opportunities that allow children to apply their knowledge, and find out answers for themselves. Children are encouraged to ask their own questions and be given opportunities to use their scientific skills and research to discover the answers. This curiosity is celebrated within the classroom. Planning involves teachers creating engaging lessons, often involving high-quality resources to aid understanding of conceptual knowledge. Teachers use precise questioning in class to test conceptual knowledge and skills, and assess pupils regularly to identify those children with gaps in learning, so that all pupils keep up.
- We build upon the knowledge and skill development of the previous years. As the children's knowledge and understanding increases, and they become more proficient in selecting, using scientific equipment, collating and interpreting results, they become increasingly confident in their growing ability to come to conclusions based on real evidence.
- Working Scientifically skills are embedded into lessons to ensure these skills are being developed throughout the children's school career and new vocabulary and challenging concepts are introduced through direct teaching. This is developed through the years, in-keeping with the topics. Vocabulary is consistent on working walls throughout the school.
- Teachers demonstrate how to use scientific equipment, and the various Working Scientifically skills in order to embed scientific understanding. Teachers find opportunities to develop children's understanding of their surroundings by accessing outdoor learning and workshops with experts.
- Children are offered a wide range of extra-curricular activities, visits, trips and visitors to complement and broaden the curriculum. These are purposeful and link with the knowledge being taught in class.
- Regular events, such as Science Week and the Science Fair, science competitions and science shares provide a broader provision and the acquisition and application of knowledge and skills. These events often involve families and the wider community.

- Children have the opportunity to learn outdoors by using our farm, forest school and local area to see Science in the real world.

## Impact

The successful approach at St Joseph and St Bede results in a fun, engaging, high-quality science education, that provides children with the foundations and knowledge for understanding the world. Our engagement with the local environment ensures that children learn through varied and first-hand experiences of the world around them. Frequent, continuous and progressive learning outside the classroom is embedded throughout the science curriculum. Through various workshops, trips and interactions with experts, children have the understanding that science has changed our lives and that it is vital to the world's future prosperity. Children learn the possibilities for careers in science, as a result of our connections with Manchester University, PSQM, ASE and learn from and work with professionals, ensuring that children have access to positive role models within the field of science from the immediate and wider local community. From this exposure to a range of different scientists from various backgrounds, all children feel they are scientists and capable of achieving. Children at St. Joseph and St. Bede overwhelmingly enjoy science and this results in motivated learners with sound scientific understanding.

## 2. Teaching and Learning

Staff and children were involved in the creation of the St Joseph and St Bede Science Principles.



**Figure 1** Science principles informed by staff and pupil voice, to represent SJSB's aims for science learning.

### Science is good when:

- We ask questions and come up with our own investigation ideas.
- We learn and use new scientific vocabulary
- Everyone is curious
- There is collaboration and team work
- We explore and use a range of equipment and materials – including the outdoors
- Science is linked to other subjects and we talk about how it is applied in the real world

These posters are on display on the working wall in science, in every PowerPoint and referred to in each lesson throughout the coverage of each science topic.

- Children are encouraged to ask their own questions and be given opportunities to use their scientific skills and research to discover the answers. This curiosity is celebrated within the classroom.
- Teachers ask a range of questions which enable all children to take part, listening carefully to answers and taking learning forward, using open and closed questions and allowing children time to think.
- Planning involves teachers creating engaging lessons, often involving high-quality resources to aid understanding of conceptual knowledge
- Teachers use precise questioning in class to test conceptual knowledge and skills, and assess pupils regularly to identify those children with gaps in learning, so that all pupils keep up.
- New vocabulary and challenging concepts are introduced through direct teaching. This is developed through the years, in-keeping with the topics.
- Working Scientifically skills are embedded into lessons to ensure these skills are being developed throughout the children's school career. The key knowledge for each topic and across each year group is mapped across the school using knowledge organisers and checked at the end of each science topic.
- Teachers demonstrate how to use scientific equipment, and the various Working Scientifically skills in order to embed scientific understanding.
- Teachers find opportunities to develop children's understanding by accessing outdoor learning.

### Scientific knowledge and conceptual understanding

The programmes of study 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. Children's starting points are identified at the beginning of each science topic through check in tasks and the children are able to convey and record what they know already. At the end of the block, children's knowledge is checked in line with the key knowledge identified prior to the teaching block using check out tasks. 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 and teachers ensure that this is developed within each lesson and throughout each science topic. The science curriculum ensures that children are provided with regular opportunities to apply their mathematical knowledge to their understanding of science, including collecting, presenting and analysing data. Through use of the 'Know Want Learn' strategy, children are also able to suggest what they would like to



learn at the start of each teaching sequence, via the wonder-wall, this allows the children to create their own big questions and this ensures that teachers are able to adapt the programme of study to ensure that this is informed by children's interests and to maximise their 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 and this is embedded within lessons and focuses 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 given opportunity 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. At St Joseph and St Bede science lessons provide a quality and variety of subject specific language to enable the development of children's confident and accurate use of scientific vocabulary and their ability to articulate scientific concepts clearly and precisely. They are encouraged and assisted in making their thinking clear, both to themselves and others, and teachers ensure that pupils build secure foundations by using discussion to probing and remedying their misconceptions.

### **3. Assessment**

Children's progress is continually monitored throughout their time at SJSB and is used to inform future teaching and learning. 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 as set out in the National Curriculum. These are set out as statutory requirements. We also draw on the non-statutory requirements to extend our children and provide an appropriate level of challenge.

Children receive effective feedback through teacher assessment, both orally and through written feedback in line with the success criteria. Children are guided towards achievement of the main objectives, one being a working scientifically objective and the second being a conceptual understanding objective complete with a 'success criteria', provided by and explained by the teacher. Children will have these to refer to in the lesson, where they will be evident in their books and used to identify areas of difficulty by children and teachers when reviewing and assessing work. They will also be present on the knowledge organisers.

Assessment for learning is continuous throughout the planning, teaching and learning cycle. However, children are more formally assessed half termly in KS1 and KS2 using a variety of methods:-

- The use of Check In and Check Out tasks to show progress throughout a topic
- Using scientific reasoning such as concept cartoons to assess children's understanding

- Using the PSTT assessment website to assess working scientifically targets against examples of work from around the country

Children identify what they know already about each topic, as well as what they would like to know. The programme of study takes is responsive to the children's starting points, as well as their specific interests. It also ensures a focus on the key identified knowledge of each topic, which is mapped within and across year groups to ensure progression. At the end of each blocked science topic, this key knowledge is checked. Outcomes of work also evidence its acquisition.

In EYFS, we assess the children's Understanding of the World using the early years outcomes at the relevant age range.

#### **4. Planning and Resources**

Planning is a process in which all teachers are involved. Planning should be done with parallel teachers. All teachers should keep a copy of the long and medium-term planning in their online files.

We have ASE membership for high quality resources and lesson plans. FOCUS provide big questions for science units. All teachers were introduced to Reach Out CPD which provides big questions, plans and teacher professional development to enhance science teaching. The key knowledge and skills of each science topic is available as 'Planning Matrices' in the subject leader folders. Teachers are able to use the PSTT for assessment ideas and examples and we have access to the National Stem Centre.

Further evidence of 'good science' taking place in classrooms includes:

- An active learning environment, showcasing the St Joseph and St Bede Principles, and relevant Working Scientifically posters on the working walls during science topic coverage.
- Children being encouraged to ask and answer questions and discuss their work and ideas.
- Children devising and conducting their own investigations within the context of the relevant curriculum content, as well as being given opportunities to develop their working scientifically skills.
- Children recording their findings in a variety of ways.
- Children showing enjoyment in the activities they are undertaking.
- The cross curricular teaching of science.

We have sufficient, high-quality science resources to aid and support the teaching of all units and topics taught, from EYFS to Y6. We keep these in the EYFS building, where they will be labelled and easily accessible to all staff. EYFS have a range of resources kept in classes, for simple access for children during exploration. The library contains a good supply of science topic books to support children's individual research. Science library books will be available in class linked to the topic that is currently being studied.



## 5. Organisation

Science will be taught in planned and arranged into topic blocks by the class teacher, to have a cross-curricular approach. All long-term plans can be found in the subject leader folder.

## 6. EYFS

The Foundation Stage deliver science content through the 'Understanding of the World' strand of the EYFS curriculum. This involves guiding children to make sense of their physical world and their community through opportunities to explore, observe and find out about people, places, technology and the environment. They are assessed according to the Development Matters attainment targets.

## 7. Key stage one:

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 should be encouraged to be curious and ask questions about what they notice. They should 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. They should begin to use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways. Most of the learning about science should be done through the use of first-hand practical experiences, but there should also be some use of appropriate secondary sources, such as books, photographs and videos.

'Working scientifically' is described separately in the programme of study, but must **always** be taught through and clearly related to the teaching of substantive science content in the programme of study. Every lesson should have a working scientifically target.

Pupils should read and spell scientific vocabulary at a level consistent with their increasing word reading and spelling knowledge at key stage 1.

## Lower Key Stage two:

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 should 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 should ask 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 comparative and 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.

'Working scientifically' is described separately at the beginning of the programme of study, but must **always** be taught through and clearly related to substantive science content in the programme of study. Every lesson should have a working scientifically target.

Pupils should read and spell scientific vocabulary correctly and with confidence, using their growing word reading and spelling knowledge.

### **Upper Key Stage two:**

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. They should do this through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically. At upper key stage 2, they should encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. They should also begin to recognise that scientific ideas change and develop over time. They should 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 comparative and fair tests and finding things out using a wide range of secondary sources of information. Pupils should 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.

'Working and thinking scientifically' is described separately at the beginning of the programme of study, but must **always** be taught through and clearly related to substantive science content in the programme of study. Every lesson should have a working scientifically target.

Pupils should read, spell and pronounce scientific vocabulary correctly.

### **8. Equal Opportunities (eg Gender, race)**

At SJSB we are committed to providing all children with an equal entitlement to scientific activities and opportunities regardless of race, gender, culture or class.

### **9. Inclusion (eg EAL/SEN/PPG/Provision for HA)**

In school we aim to meet the needs of all our children by differentiation in our science planning and in providing a variety of approaches and tasks appropriate to ability levels. This involves providing opportunities for SEND children to complete their own projects, with

support, to develop speech and language skills, as well as scientific skills and knowledge. This will enable children with learning and/or physical difficulties to take an active part in scientific learning and practical activities and investigations and to achieve the goals they have been set. Some children will require closer supervision and more adult support to allow them to progress whilst more able children will be extended through differentiated activities. By being given enhancing and enriching activities, more able children will be able to progress to a higher level of knowledge and understanding appropriate to their abilities. Teachers will use the school's inclusion policy to ensure that a range of strategies are used which include and motivate all learners, ensuring that optimum progress is made throughout each part of the lesson.

#### **10. Role of the Subject Leader**

It is the responsibility of the subject leader to monitor the standards of children's work. The subject leader is also responsible for supporting colleagues in their teaching, for being informed about current developments in the subject, and for providing a strategic lead and direction for science in the school. The subject leader monitors the budget, resources science topics and books trips and workshops to support learning. The subject leader will fulfil the task of reviewing samples of children's work, training, liaising with other subject leaders from other schools and organising wider community initiatives such as the science fair.

#### **11. Parents (Including Homework)**

Parental input is highly valued and parents are regularly invited and welcomed into school to share their own expertise with the children. There is an annual family science fair event, plus two home-based science competitions that engage many families in scientific activity. Children may receive science homework based on their current topic.