St. Bernadette's RC Primary School

Science Policy

Together we Learn. Together we Achieve. Together we grow in God's Love.

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1. Subject 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. Bernadette's, our curriculum has been developed to ensure a full coverage of the National Curriculum and to foster a sense of wonder about God's natural world. As a school, we recognise the importance of science in every aspect of daily life and believe that the teaching and learning should excite and stimulate children's natural curiosity to enable them to make sense of the world in which they live. Positive attitudes and a respect for creation and the World in which they live in is very much promoted.

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.

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

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

Where possible, our science curriculum is linked to our topic "themes" to provide a creative scheme of work. 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 'Big Questions'. 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 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 use equipment, conduct experiments, build arguments and explaining concepts confidently and continue to ask questions and be curious about their surroundings.

Children are encouraged to use a range of methods to communicate their scientific knowledge and understanding. Their use of scientific vocabulary is developed as they move through school.

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, half-termly units by the class teacher (see our Science Curriculum Roadmap), linked, where possible, to our topic “themes” to provide 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, focusing on enquiry-based learning. 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
- 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 model 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.
- Children experience a range of activities, including visits, trips and visitors to complement and broaden the curriculum. These are purposeful and link with the knowledge being taught in class.
- Children have opportunities to learn Science outdoors.

Impact

The approach at St Bernadette's results in a fun, engaging, high-quality science education, that provides children with the foundations and knowledge for understanding the world. By investigating Science through lines of enquiry in real life contexts, children appreciate that science has changed our lives and that it is vital to the world's future prosperity. Our engagement with the local environment, ensure that children learn through varied and first-hand experiences of the world around them. Children learn the possibilities for careers in science, as a result of our connections with PSQM, ASE and from meeting professionals who work in the field of science. Children have exposure to a range of different scientists from various backgrounds, periods and gender. These provide positive role models and inspiration. As a result of this journey, our children enjoy being scientists and acquire sound scientific understanding.

2. **Teaching and Learning**

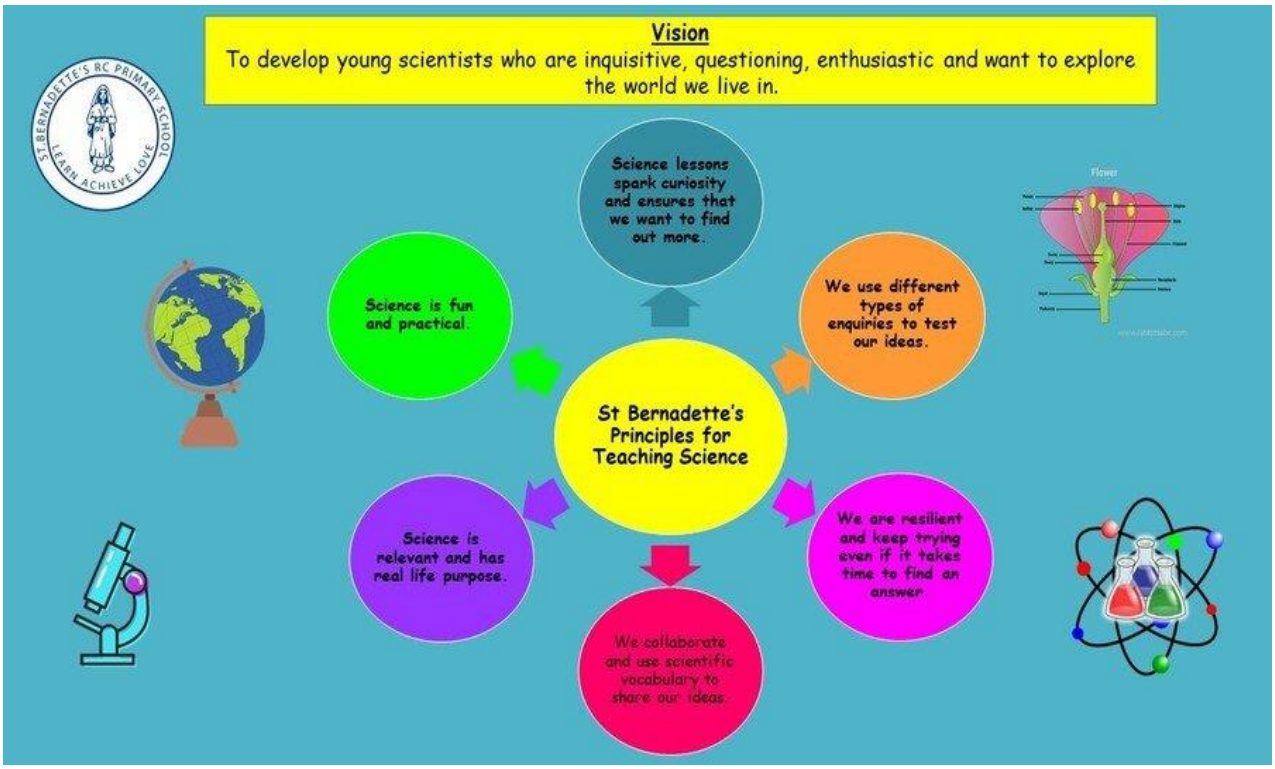

Figure 1 St Bernadette's Science Principles informed by staff and pupil voice, to represent St Bernadette's aims for science learning.

Science is good when;

- Science lessons spark curiosity and ensure that we want to find out more.
- Science is fun and practical.
- We use different types of enquiries to test our ideas
- We collaborate and use scientific vocabulary to share our ideas
- We are resilient and keep going even if it takes time to find an answer.
- Science is relevant and has real life purpose.

These posters are displayed on the Science working wall, and referred to in each unit of work.

- 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 each phase, 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 is mapped across the school using our Subject Learning Progression Document and our Working Scientifically Skills Progression Document.
- 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.

<u>Recording Learning</u>

Children are encouraged to use a range of methods to communicate their scientific knowledge and understanding. Any written work is recorded in individual pupil books (tasks involving individual responses) or a Class Big Book (tasks requiring groups or whole class responses). There should be a balance of work in the 2 book types.

Scientific knowledge and conceptual understanding

The programmes of study describe a sequence of knowledge and concepts. Children's starting points are identified at the beginning of each science unit through assessment. At the end of the unit, children's knowledge is checked in line with the key knowledge identified prior to the unit. Pupils should be able to describe associated processes and key characteristics in common language, but they should also increasingly use technical terminology accurately. 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. Big questions are presented to children at the start of units to stimulate thinking and to maximise their engagement.

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. At St Bernadette's, scientific vocabulary is developed to enable the children's confident and accurate use of scientific vocabulary and their ability to articulate scientific concepts clearly. 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 St Bernadette's 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.

Children receive effective feedback through teacher assessment, sometimes orally and sometimes 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 and explained by the teacher.
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 Concept maps
- The use of Check In and Check Out key questions 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

The programme of study 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 science unit, 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 their planning on the Server.
We have ASE membership for high quality resources and lesson plans. 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.

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

- An active learning environment and relevant Science Working Wall.
- Children being encouraged to ask and answer questions and discuss their 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.

Science resources to support the teaching of science are kept in the Science Cupboard, where they will be labelled and easily accessible to all staff. Year 6 Lab technicians will bring out/put back equipment if requested by the class teacher prior to the lesson. 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 research.

5. **Organisation**

Science is taught by the class teacher in half-termly units (2-year cycle), linked where possible, to our topic "themes" to provide a creative scheme of work, which reflects a balanced programme of study. This is illustrated in our Science Curriculum Roadmap and is followed by all class teachers.

A summary of the learning focus at each phase is described below. However, more detailed progression documents have been devised and are used by class teachers to plan units of work. These are St Bernadette's R.C. Primary School Science Curriculum Document and The Working Scientifically Skills Progression Document.

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 to communicate their ideas 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 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 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 St Bernadette's 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, with support, 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 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. 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 will also audit resource annually and purchase equipment required. 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 Science related school events, such as Science Day.

11. **Parents**

Parental input is highly valued and parents are welcomed into school to share their own expertise with the children. Children may receive science homework based on their current topic. Parental views about our Science Curriculum are sought through a parental questionnaire.