

SCIENCE POLICY

OUR LADY & ST JOSEPH CATHOLIC PRIMARY SCHOOL

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APPROVED BY: Governing Body

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1. Subject Statement

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.

1.1 Aims

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 knowledge required to understand the uses and implications of science, today and for the future.

1.2 Scientific Knowledge and Conceptual Understanding

The programs of study in the 2014 Primary National Curriculum 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.

Insecure, superficial understanding will not allow genuine progression, pupils may:

- Struggle at key points of transition such as between primary and secondary school)
- Build up serious misconceptions;
- Have significant difficulties in understanding higher-order content.

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.
- Build up an extended specialist vocabulary.
- Apply their mathematical knowledge to their understanding of science, including collecting, presenting and analysing data.

The social and economic implications of science are important but, generally, they are taught most appropriately within the wider school curriculum: teachers will wish to use different contexts to maximise their pupils' engagement with and motivation to study science.

1.3 The Nature, Processes and Methods of Science

The term 'working scientifically' in the 2014 Primary Curriculum, specifies the understanding of the nature, processes and methods of Science for each year group. It should not be taught as a separate strand. The notes and guidance provided with the 2014 Primary Curriculum give examples of how 'working scientifically' might be embedded within the content of biology, chemistry and physics, focusing 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 should include:

- Observing over time
- Pattern seeking
- Identifying, classifying and grouping
- Comparative and fair testing
- Researching using secondary sources.

Pupils should seek answers to questions through collecting, analysing and presenting data. 'Working scientifically' will be developed further at key stages 3 and 4, once pupils have built up sufficient understanding of science to engage meaningfully in more sophisticated discussion of experimental design and control.

1.4 Spoken Language

The 2014 Primary National Curriculum for science reflects the importance of spoken language in pupils' development across the whole curriculum – cognitively, socially and linguistically. The quality and variety of language that pupils hear and speak are key factors in developing their scientific vocabulary and articulating scientific concepts clearly and precisely. They must be assisted in making their thinking clear, both to themselves and others, and teachers should ensure that pupils build secure foundations by using discussion to probe and remedy their misconceptions.

2. Teaching and Learning

2.1 Vision for Science at Our Lady & St Joseph

The vision for Science at OLSJ involves contributions from both staff and children. Our vision statement is:

‘Through a practical, enquiry-based approach, our learners will grow into the scientists of the future – an engaging curriculum will allow them to question and learn about the world around them’.

2.2 Core Principles of Science Teaching and Learning



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

Science is good when ...

- We are inspired and challenged in our learning.
- Our lessons are practical and engaging.
- We ask questions to explore the world around us.
- Lessons develop our enquiry skills.
- We use dialogic talk to assist our learning.

These principles are displayed on our classroom Science displays, on the school's blog, and are regularly referred to during planning and in the teaching and learning of Science.

Science is also effective when:

- Medium term planning ensures lessons are appropriately differentiated to ensure all abilities are catered for meaning all children can reach their full potential.
- Throughout lessons, children are motivated to ask questions and are given opportunities to apply their scientific skills in finding their own answers.
- Learning objectives use the five enquiry types as driver words. The children's curriculum is well thought out to ensure there is appropriate coverage of the enquiry skills.
- All Science lessons use a range of AFL techniques to ensure that a dialogic approach applied in science teaching and learning. Therefore, peers learn from one another, pupils learn from their teachings and in turn, teachers learn from their pupils.

3. Planning and Resources

Planning and resourcing is carried out by the class teacher. Medium term planning should include:

- The National Curriculum 2014 objectives
- Prior knowledge
- Future learning
- Key language
- Risk Assessments following CLEAPPs guidelines when necessary.

The 'Plan Assessment' knowledge matrices inform the school's planning and progression is covered following the 'Plan Assessment' working scientifically progression document. Teachers also have access to the 'Association of Science Education' resources, 'Milgate Concept Cartoons' and 'Explorify' resources to support with this process.

3.1 The Organisation of Science

At Our Lady & St Joseph, Science is centered on an enquiry-based approach. It is planned and taught according to topic blocks.

- In EYFS pupils are taught five topics.
- In Key Stage One, pupils are taught four topics, in line with the National Curriculum, each topic lasting nine weeks.
- In Key Stage Two, there are five topics each lasting seven weeks.

The programmes of study for science in the 2014 Primary National Curriculum are set out year-by-year for Key Stages 1 and 2. Schools are, however, only required to teach the relevant programmes of study by the end of the Key Stage.

Within each key stage, we therefore have the flexibility to introduce content earlier or later than set out in the programme of study.

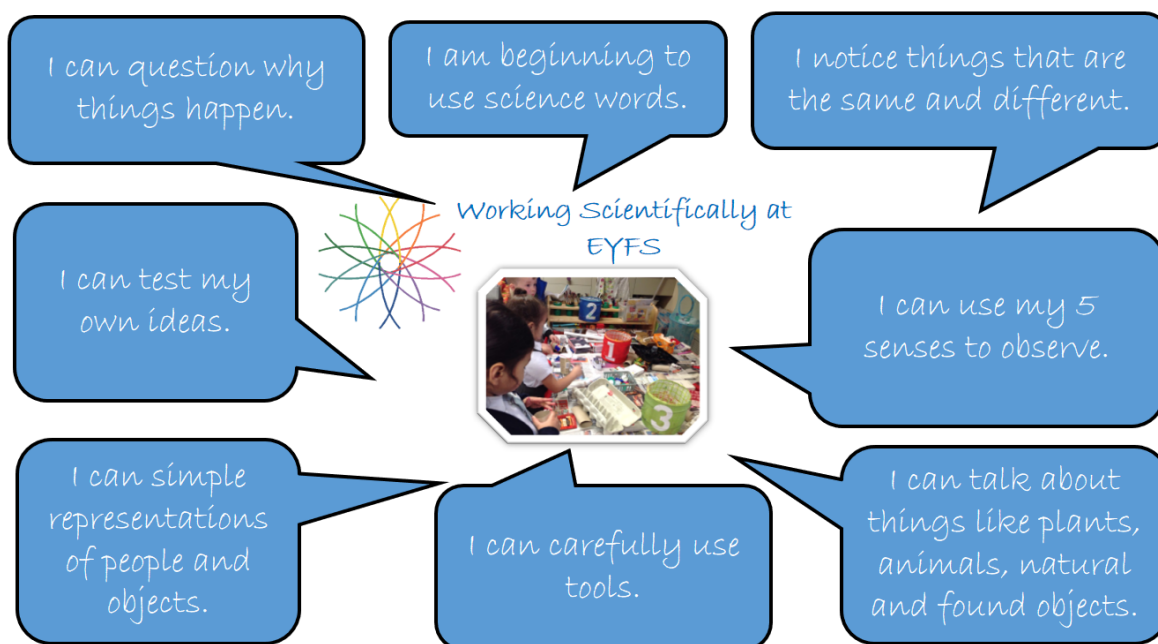
In addition, we can introduce Key Stage content during an earlier Key Stage, if appropriate.

Our Lady & Joseph will set out our curriculum for science on a year-by-year basis and make this information available online.

3.2 Topics Covered in Each Year Group

Nursery				
Autumn	Winter	Spring and Growing	Life cycles, mini beasts and growing	Summer
Reception				
Autumn/ Planting	Winter/Animals	Spring/Animals and Growing	Life cycles	Summer
Year 1				
Animals Including Humans	Everyday Materials	Seasonal Changes	Plants	
Year 2				
Everyday Materials	Living Things and Their Habitats	Animals including Humans	Plants	
Year 3				
Animals including Humans	Rocks and Soils	Forces and Magnets	Plants	Light
Year 4				
Animals including Humans	Living Things and their Habitats	Electricity	Sound	States of Matter
Year 5				
Earth and Space	Forces	Properties and Changes of Materials	Living Things and Their Habitats	Animals Including Humans
Year 6				
Light	Electricity	Evolution and Inheritance	Animals including Humans	Living Things and Their Habitats

3.2 Early Years Foundation Stage



At the Early Years Foundation Stage, teachers guide their pupils in working scientifically through exploration, observations and real-life experiences. Through these, pupils gain insight of people, places, technology and the environment and begin to make logic of the world around them.

At OLSJ, pupils are delivered their Science education through the 'Understanding the World' strand of the EYFS curriculum. Teachers continually assess all children against the learning and development bands, the Early Learning Goal and Exceeding descriptors through focused activities and observations of their play and exploration. Children's progress is evidenced in their Learning Journals and their 2Simple profiles.

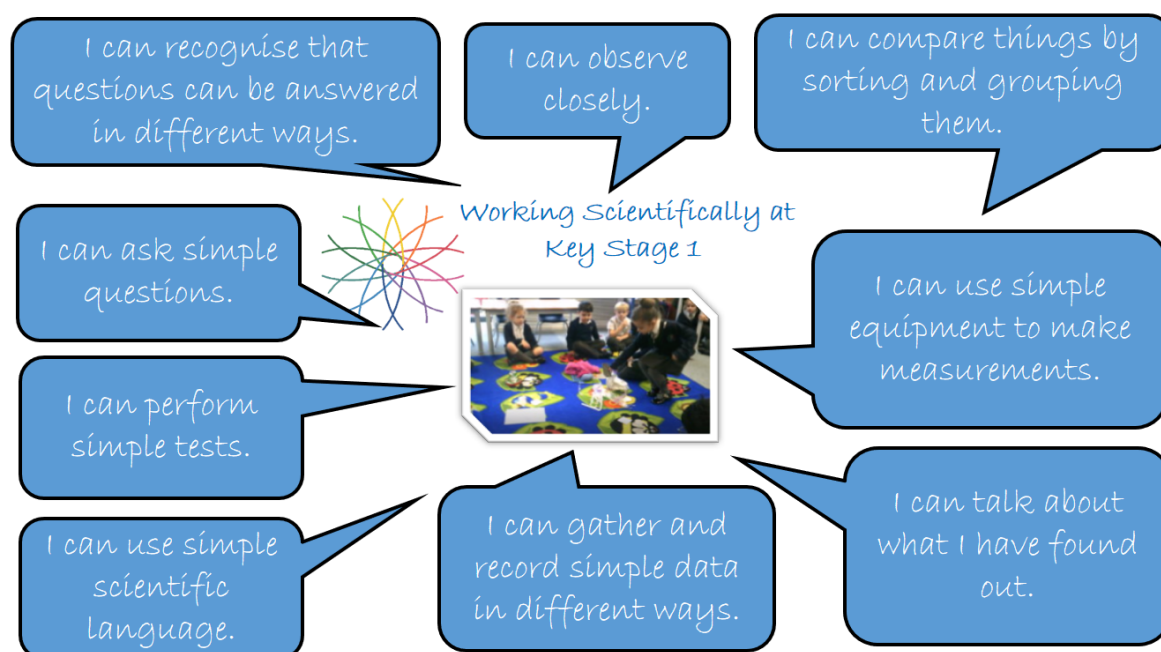
The pupils are assessed according to the age bands under the 'Understanding the World' area of learning on entry to Nursery and Reception, and at the end of each term. This enables staff to know every child's starting points in their early Science skills, and as they track progress termly they can then plan to develop scientific inquiry and skills into each half-termly topic.

This ensures pupils are making progress towards achieving or exceeding the 'Understanding the World' Early Learning Goal at the end of Reception.

Pupils have a wide range of starting points on entry to Nursery and Reception, the table below highlight the range of progress we aim to achieve as children progress through the Early Years Foundation stage:

<i>Nursery age bands</i>	<i>Understanding of the world Development Band</i>
<i>16 – 26 months</i>	• Explores objects by linking together different approaches: shaking, hitting, looking, feeling, tasting, mouthing, pulling, turning and poking. • Remembers where objects belong. • Matches parts of objects that fit together e.g. puts lid on teapot.
<i>22 – 36 months</i>	• Enjoys playing with small-world models such as a farm, a garage, or a train track. • Notices detailed features of objects in their environment.
<i>30 – 50 months</i>	• Comments and asks questions about aspects of their familiar world such as the place where they live or the natural world. • Can talk about some of the things they have observed such as plants, animals, natural and found objects. • Talks about why things happen and how things work. • Developing an understanding of growth, decay and changes over time. • Shows care and concern for living things and the environment
<i>Reception age bands</i>	<i>Understanding of the world Development Band</i>
<i>40 – 60+ months</i>	• Looks closely at similarities, differences, patterns and change.
<i>Early Learning Goal</i>	• Children know about similarities and differences in relation to places, objects, materials and living things. • They talk about the features of their own immediate environment and how environments might vary from one another. • They make observations of animals and plants and explain why some things occur, and talk about changes.
<i>Exceeding the Early Learning Goal</i>	• Children know that the environment and living things are influenced by human activity. • They can describe some actions which people in their own community do that help to maintain the area they live in. • They know the properties of some materials and can suggest some of the purposes they are used for. • They are familiar with basic scientific concepts such as floating, sinking, experimentation.

3.4 Key Stage 1



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.

Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content. Pupils should read and spell scientific vocabulary at a level consistent with their increasing word reading and spelling knowledge at Key Stage 1.

3.5 Key Stage 2 – Lower Phase



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.

Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content. Pupils should read and spell scientific vocabulary correctly and with confidence, using their growing word reading and spelling knowledge.

3.6 Key Stage 2 – Upper Phase



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. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content. Pupils should read, spell and pronounce scientific vocabulary correctly.

3.6 Sequence of Teaching

At Our Lady & St Joseph we believe consistency across the year groups promotes better learning outcomes. At KS1 and KS2, medium term planning adheres to the following format in all year groups:

1. Topic Cards are placed in books, listing the key scientific language for each unit – children should refer to these throughout the block of learning and apply the appropriate scientific language within their work.
2. Concept Cartoon Assessments – children complete a concept cartoon at the start and end of each topic. These are used to highlight misconceptions and show progression over time.
3. KWL Grids – Children complete KWL grid and should be referred to throughout the unit. These are used as a device in promoting pupil ownership within their learning and also an assessment tool for teachers.
4. Sequence of lessons – teachers plan their topic blocks following the 'PLAN Assessment' matrices. All Learning objectives should use the enquiry types as key driver words when possible and the success criteria should be created from the working scientifically progression document. This should be displayed in pupils' books and highlighted in green if they have achieved the skill.
5. Assessment – Children go back to their Concept Cartoons and KWL's to review their understanding

Throughout each topic block, there should be an emphasis on developing the children's Science capital.

This may be through a range of 'Explorify' starters, completing regular 'Where's the science in that?' drop-ins and develop the children's knowledge of significant scientific pioneers.

4. Assessment

Throughout their time at Our Lady & St Joseph, children's progress is continually monitored via formative and summative assessment measures which are used to inform future teaching and learning.

By the end of each key stage, learners are expected to know, use and comprehend, skills and knowledge outlined 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. Some of the summative and formative assessments we use are:

- Children's misconceptions are pre-anticipated within medium term planning.
- KWL grids are check pupils prior learning and promote pupil ownership.
- Concept cartoons are used as initial assessments of learning and returned to at the end of the topic to show progress over the unit.
- The working scientifically skills are used as the success criteria for lessons and highlighted when achieved.
- Children receive effective feedback through teacher assessment, both orally and through written feedback in line with the success criteria. 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.
- Children are guided towards achievement of the main objective through the use of process based 'success criteria', provided by and explained by the teacher.
- A range of assessment for learning strategies are used throughout planning, delivery and overall learning cycles.
- Pupil observations: this includes children's work individually, in partners and in a group setting.
- Dialogue talk and questioning.
- Pupils are assessed on their topic knowledge and working scientifically skills half termly on Pupil Asset.

5. Equal Opportunities and SEN

Teachers will have high expectations of all children regardless of gender, race, class and special needs. Teachers will strive to ensure that all children have equal access to the science curriculum. Planning will be differentiated so that all children can participate and reach their full potential.

6. Computing

Computers are used throughout the school to enhance the work of the pupils. Pupils can use the internet for research. There are also a range of interactive activities located online that children can use to further develop their scientific knowledge. Digital cameras can be used to record evidence of practical work.

7. The Role of the Subject Leader

The Lead Teacher for Science will lead focused INSETs. They will also select and orders new equipment and book materials as appropriate. Staff will be updated regularly as a result of the Lead Teacher for Science attending training courses and disseminating information. The Lead Teacher for Science will also help individual teachers by assisting in planning, offering support in class and providing relevant scientific background for non-specialist teachers.

7.2 Evaluating and Monitoring

The science policy of the school is reflected in our practice. This is monitored by the Lead Teacher for Science and is reviewed annually by the staff. New members of staff will be introduced to the policy by the Lead Teacher for Science and the members of staff in the same year group will team plan. The Lead Teacher for Science will monitor books and displays regularly to ensure work is appropriate to the age group and in line with the school policy and schemes of work. The Lead Teacher for Science will observe the teaching and learning of science across the school at least once a year. Success of our science teaching will be judged by:

- The motivation and interest displayed by our pupils.
- The development, over time, of pupils' understanding of scientific concepts and processes
- Pupil's ability to apply their understanding in a variety of new situations
- Ensuring whether work is differentiated appropriately to cater for the needs of each child.
- Whether lessons follow the school's core principles for Science.

8. Health and Safety

Health and Safety It is the responsibility of the staff to adhere to all safety measures in the school Health and Safety Policy. In accordance with The Department for Education Statement dated 28th November 2011. When children work with tools, equipment and materials, in practical activities in different environments, including those that are unfamiliar they are taught:

- About hazards, risks and risk control.
- To recognise hazards, assess consequent risks and take steps to control the risks to themselves and others.
- To use information to assess the immediate and cumulative risks.
- To manage their environment to ensure the health and safety of themselves and others to explain the steps they take to control risks. The school has a risk assessment form which focuses on health and safety issues surrounding the teaching and learning of science.

Teachers must follow CLEAPSS guidelines when carrying out activities and risk assessments need to be made evident on medium term planning.

8. The Organisation of Science Resources

Classrooms are equipped with a selection of books that are age-appropriate and support the science curriculum. Resources are stored in the Science resources area in the cupboard below Year 2 and are arranged according to the units of work they support. The school grounds are a valuable resource particularly for attainment target 2. Children will become familiar with animal life, plant growth and seasonal change by visiting the garden at least once a term.