

Intent Implementation Impact



Science

Intent

The Science curriculum at Our Lady and St Rose of Lima Primary School has been designed to facilitate our children to become 'scientists of the future.' We want our children to understand the wonderful world that God has created and appreciate the difference we can make in protecting it now and for future generations. By equipping them with the essential scientific skills, our curriculum will enable them to not only understand the world but how they can make an impact on it.

Our 'knowledge rich' curriculum follows the National Statutory Framework for EYFS and the National Curriculum for years one to six and has been designed to ensure a progression of skills, starting in Nursery and Reception through Understanding of the World and continuing throughout each key stage. It enables all our children, regardless of background or ability, to exceed the requirements of the National Curriculum through challenging the children's learning within the specific scientific disciplines of biology, chemistry and physics.

In Early Years, science is explored through 'Understanding of the World' where they are taught about plants, space, animals and humans. They explore the different seasons we experience and a range of habitats, looking at which animals they are best suited to and why. During this, the beginning of their scientific journey, they also learn about what a scientist is and some significant scientists and explorers that have made an impact on the world both in the past and today. Introducing them to careers in Science at an early age is an important part of our curriculum as it plants the seed about what they can aspire to be when they are older.

As the children move into Key Stage 1 and again into Key Stage 2, the knowledge gained in EYFS is developed and challenged further. Through teaching progressively, our children are able to build on their knowledge incrementally and are given many opportunities to develop and extend their knowledge and understanding, as specific subject content is revisited at different points throughout the curriculum and their scientific journey. This approach to learning not only allows them to master knowledge and concepts, whilst building and developing an extended specialist vocabulary, but it also provides teachers with the opportunity to identify and close any gaps in knowledge or understanding. For example, through the 'Growing and Changing' topic taught in EYFS, the nursery children learn that plants need water and light in order for them to grow. As they move into Reception, this understanding is developed further by introducing Botanists and what would happen to plants if they are not watered or given light. In Key Stage 1, the children recognise that plants also need warmth and space, in addition to water and light, but that seeds and bulbs are able to survive without light because they have a store of energy.

By Key Stage 2, their understanding of the requirements for plant growth develops further by looking at the purpose of each of the parts of a plant and how plants reproduce and pollinate. This is just one example of the progressive nature of the Science curriculum here at St Rose.

A fundamental part of the curriculum is the way in which our children's knowledge is retained and assessed. The use of knowledge organisers within each topic provides the children with the key vocabulary and learning points that they will encounter during the topic. All children have access to these during each lesson, with adapted versions provided those children who benefit from visual resources, and these help form part of their prior learning activities. We believe prior learning and regular reassessments are a core element of our curriculum design as they not only provide the children with the tools to facilitate their knowledge recall, but also the teachers with a mechanism to assess their long-term retention of key information.

Our curriculum has been designed so that all children are able to access the rich knowledge taught throughout each year group. We recognise the need to expose our children, particularly those from disadvantaged backgrounds, to an extensive range of high quality vocabulary. Each lesson has therefore been designed to introduce and explain new vocabulary, including the origins of the words, to enhance their vocabulary. Star words feature in each lesson and the children are given the chance to orally rehearse them throughout the teaching. Investigations provide the opportunity for a more practical approach to learning and tasks are adapted to ensure everyone is able to demonstrate their understanding during each lesson. Our use of technology throughout the curriculum, ensures that our children have immediate access to resources that will assist them with their learning and understanding.

We want our children to be excited about the scientific world and the opportunities available to them. Our curriculum offers many opportunities to learn practically as well as theoretically. Units have been designed to teach the necessary substantive knowledge, prior to any investigations, in order for the children to fully understand the elements of an enquiry and make informed observations about the processes they see. It aims to enhance the children's confidence in working scientifically by developing their skills in observation, questioning, fair testing, prediction, recording, analysing and concluding in a variety of situations. Our school trips provide the children with a variety of different opportunities to experience science personally through a hands on approach. These trips offer them life experiences that not only enhance their learning by bringing the subject to life but also, because of the backgrounds of many of our children, provide them with opportunities to visit and explore places that they would not normally have the opportunity to discover with their families.

Throughout our curriculum, our children are taught about significant scientific discoveries that have been made since time began and the impact that these have had for us today. They encounter people who have made significant contributions within the field of Science and the STEM subjects and are encouraged to ask questions to help them develop a sense of curiosity about the world around us. We believe it is vital they learn about scientists whose discoveries have transformed the way we live today so that they may gain a better understanding of the purpose and uses of science both today and in the future. The scientists studied come from a range of diverse backgrounds, including gender and race, so that have role models to inspire them and help them understand that there are no barriers for them as they move through school and into the workplace.

It is our intention that our curriculum will enable all our children to fully appreciate the important role that science plays on the sustainability of the world that God has created for us through their primary education. By the end of Year 6, we want our children to be equipped with a curiosity, passion and a desire for discovery that will enable them to make facilitate them in their secondary education and encourage them to make significant contributions to our world as they grow older.

Implementation

Our children begin their scientific journey in the Early Years Foundation stage through the 'Understanding the World' unit. The variety of topics studied in both Nursery and Reception allow them to explore open ended questions and partake in a variety of different investigations to help them develop their scientific thinking. Even at this early age, the children are exposed to challenging scientific vocabulary and topics that are engaging and exciting for the children. Our teachers recognise the need to create a positive attitude and excitement for this subject and each lesson includes a range of activities, designed to create a sense of wonder and awe.

Our Science curriculum is taught using a knowledge based approach using key principles from Rosenshine's approach to learning. The structure of each lesson follows a specific format and delivered through high quality lesson powerpoints. Each lesson is designed to revisit prior learning, introduce new vocabulary and provide opportunities for discussion whilst also offering the ability to investigate and demonstrate the children's understanding of the key concepts taught.

As part of our curriculum design, in KS1 and KS2 our science lessons are taught weekly as we believe this provides sufficient time to carry out meaningful investigations, which further enhances the children's enthusiasm for the subject and embeds the knowledge rich learning that takes place within each lesson. The children build on the knowledge learnt in EYFS and have more formal science lessons, where they are taught to use practical skills, ask questions, observe and identify and classify through our knowledge rich curriculum. Through these lessons, the children are exposed to a range of investigations that enrich their scientific skills. Our teaching staff share their passion for the subject and provide a range of strategies to ensure all of our children, including SEND and those from a disadvantaged background, are able to access the curriculum and achieve their full potential.

Lesson structure

Each lesson powerpoint features an **overview** of the unit; an essential tool to ensure our teachers understand the content of the Science unit and how it the coverage it provides of the National Curriculum.

Overview	
<p>Lesson Series</p> <ol style="list-style-type: none"> 1. The Big Bang and the expanding universe 2. Gravity 3. Our Solar System 4. The Moon 5. Our Galactic neighbourhood 6. Assessment 	<p>National Curriculum Coverage</p> <ul style="list-style-type: none"> Describe the movement of the Earth and other planets relative to the sun in the solar system Describe the movement of the Moon relative to the Earth Describe the Sun, Earth and Moon as approximately spherical bodies Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.
<p>What you need to know</p> <ul style="list-style-type: none"> Stars in the universe are grouped into galaxies, which are groups of stars held together by gravity Our galaxy is the Milky Way, containing billions of stars (it looks to us like a fuzzy milky-white stripe in a dark sky) Our nearest neighbour is Andromeda galaxy, 2 ½ million light years away Astronomers believe 14 billion years ago, the universe was packed into a super-dense ball. Something caused it to explode with a big bang, sending matter into space. This matter became stars, planets and everything else. Gravity is a force which pulls all objects towards each other. We only feel the affect of gravity from the enormous object we are on: Earth. The Earth's gravity holds us to the Earth's surface; the Sun's gravity holds the Earth in orbit around it. The Solar System is all the planets, moons and other heavenly bodies that circle around the Sun. The Sun is at the centre of the Solar System, and gravity keeps everything else orbiting around it. The Moon is the Earth's only natural satellite. It is much smaller than the Earth. Depending on the position of the Sun and Moon relative to us, we see all, part or none of the Moon. These are known as the phases of the Moon. Twelve humans have landed on the Moon so far: Neil Armstrong and Buzz Aldrin were the first. The universe is so vast that scientists have divided it up into different scales to better study it. Our Solar System is a tiny part of The Milky Way galaxy. This is our home galaxy, about 100,000 light years across. The Milky Way, Andromeda and some others form 'The Local Group' of galaxies. These in turn are small parts of huge galaxy clusters and superclusters. Our home supercluster is called Laniakea and contains over 100,000 galaxies. 	

Key vocabulary is introduced each lesson. The vocabulary is referred to as a 'star' word and the children are taught the definition and, where appropriate, the origin of the word. The vocabulary chosen, is an important part of the lesson and the children will recognise it through the use of the star during the lesson. The children are encouraged to explain the word and the meaning as part of the lesson and this further enhances and develops their vocabulary and understanding.

Our **lessons** provide high quality images and key facts to engage the children throughout the lesson. We pride ourselves that we do not overload our slides with text as we believe it is important that our teachers deliver the knowledge in an engaging and exciting way. Where appropriate, we enhance the children's experience through the use of VR headsets; providing the children with an opportunity to discover science in an interactive and stimulating way.

Before each task, the children are given the chance to **talk** to their partner and questions are posed that not only consolidate their learning from the lesson but also prepare them for the task ahead. We believe this is a fundamental part of the lesson as it provides an opportunity to address any misconceptions that children may have whilst also enabling them to discuss the key concepts in a child-friendly way.

Vocabulary

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Friction

A force that occurs when two objects touch each other.
Resistance that one surface or object encounters when moving over another.

Vocabulary check point

 air resistance	 water resistance	 streamline	 parachute	 upthrust	 Float	 buoyancy
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Teach

Sun - 88% of the mass of the entire ★

Centre - surrounded by 8 ★★

Closest star to Earth - 93 million miles away

Giant ball of churning, glowing, expanding gas

Surface is 5,500 degrees Celsius - 16 million degrees at core!

Talk

Why does the moon appear to change shape throughout the month?

Each lesson includes a **task or investigation** that has been specifically designed to assess the children's understanding. During lessons where an investigation has taken place, the results and findings are recorded on Seesaw. These investigations are collated throughout their primary scientific journey to further demonstrate the progress in their learning and to celebrate what has been done. Lesson specific tasks are then recorded in the

children's individual 'STEM' books as this celebrates what their understanding of the knowledge taught and what they now 'know'. The children reflect on the knowledge goals set for the lesson and self-mark at the end of the lesson to assess whether they have met the goals through their work. Our children are encouraged to challenge their learning further through a 'step for depth' task. These tasks provide our children with the opportunity to think deeper about what they have learnt in the lesson and apply their understanding in a different way.

Adapted tasks are provided in each lesson to enable all our children to achieve the knowledge goals. The tasks enable the children to orally record their responses; to orally record and then write their responses, interactive tasks along with the use of sentence starters to scaffold their work. Many of the adapted tasks are recorded in Seesaw and the knowledge goals are assessed once they have been completed. Pictorial representations for an integral part of these adapted tasks to support their children and allow them to demonstrate their understanding.

At the end of each lesson, a **final question** or thought is posed to the children. This provides a final opportunity to assess the children's understanding through a class discussion.

Date:
L.O. Friction, Air Resistance and Water Resistance

Knowledge Goals

1. I know friction gives us grip which allows us to start and stop moving.
2. I know air resistance is a kind of friction that slows down objects moving through the air.
3. I know water resistance is a kind of friction that slows down objects moving through water.

Task: Scientific Drawings and explanation

Draw a diagram and then explain the following:

1. Friction
2. Air Resistance
3. Water Resistance

Step for Depth

Which forces might a racing car designer need to consider and why?

Lesson 2 Adapted task

Draw an image to represent the following forces.

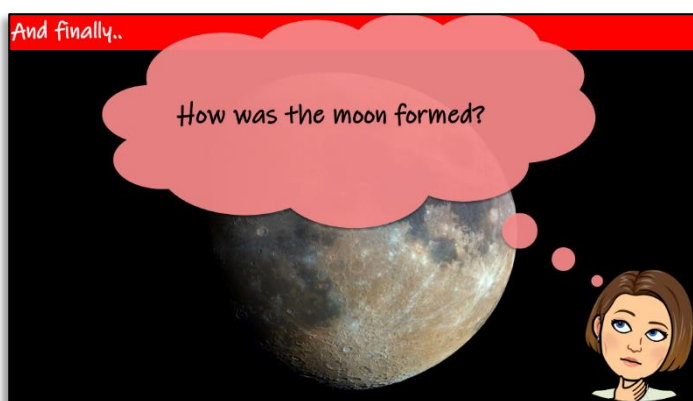
1. Friction
2. Air Resistance
3. Water Resistance

Now, use the sentence starters to below to explain what each force is.

Friction is a force that

Air resistance makes

Water resistance makes



Assessment is vital part of our curriculum. Through a clear progression of skills and the emphasis on prior learning throughout the curriculum, our children and staff are able to pre-empt or address any misconceptions that may have occurred in previous year groups. We recognise that continual assessment throughout a unit is essential and is far more effective than a simple test at the end. At the end of each unit, the children complete our children a longer assessment task, which enables them to demonstrate their understanding through 'big questions' and extended writing tasks. In addition to this, the children complete a multiple choice quiz, designed to assess their understanding from the lessons. These quizzes are then reassessed throughout the year, along with other retrieval activities through timetabled retrieval practise sessions and homework. We believe this is a fundamental part of our curriculum to ensure our children are able to retain the information taught and build on them as they move through the school. Teachers use these extended tasks and retrieval practises, along with their formative assessment throughout the lessons, to assess the children's understanding against the National Curriculum requirements.

Our Science curriculum enables the children to recognise the links made with other subjects. Topics are further explored through reading activities in English, links are made within History lessons through the work of different scientists and discoveries made in the past, current issues are raised in Geography lessons through exploring the world and investigations bring Maths to life through recording and interpreting results obtained within the Science lessons.

Science is continually changing and we want our children to understand the role that they can play for the future of science. Our children are given a range of enrichment opportunities to enhance their passion for science including carefully planned trips and the annual British Science Week where we promote links with the STEM Association. We want our children to understand that they could be scientists of the future and want to raise their aspirations in the associated STEM (Science, Technology, Engineering and Maths) subjects. During our vocations week, we highlight the possible careers available to them to enable them to recognise that they could be future scientists and engineers who make the world that God created a better place for all.

Impact

Our carefully planned curriculum results in a knowledge rich education that enthuses our children and provides them with the opportunity to take part in fun, engaging lessons that are aspirational and enable them to continuously develop their scientific understanding.

Through our lessons, the tasks we provide and the continual reassessment of their learning, we are confident that all our children are able to build upon previous learning and extend their scientific knowledge as they move through each year group. Prior learning tasks at the beginning of each lesson ensure that our teaching staff are able to address any misconceptions prior to introducing a new topic and during the topic. Teachers use this information to adapt future planning to ensure that repeated misconceptions do not occur with other year groups.

Understanding our pupils learning habits is an essential part of ensuring maximum impact for their learning. Pupil voice provides the children with the opportunity to share their ideas and celebrate what they have enjoyed in the lessons.

We want our children to recognise the importance and science, both in school and the rest of society, and want them to be able to articulate this confidently and eloquently. As a result of our knowledge rich Science curriculum, once our children leave our school for secondary education, we are confident they leave having a strong foundation for understanding the world they live in, the role that science has to play in this and the impact that they could have in the future.