St. Joseph's

Catholic Primary School

Science Policy

Last Reviewed Date – March 2023

Science Policy

Our Vision:

Our curriculum is integral to the fulfilment of our school vision:

Our vision is At St. Joseph's is that each individual will **learn, grow and thrive** together with love and faith in Jesus. We will embrace our gospel values and enable all children to **achieve their full potential** in a safe, welcoming and happy learning environment. We will strive to **create responsible citizens** who are **independent, confident, life-long learners** and are equipped to meet the challenges of a changing future **– the people who God calls them to be.**

'We will learn, grow and thrive together with love and faith in Jesus to achieve their full potential….'

St. Joseph's vision for the children, is that they leave St. Joseph's having achieved their full potential in all areas and have the necessary skills and knowledge to flourish to their next phase of education and life. As children learn and grow, we want them experience a deep sense of joy in everyday life and to feel happy, confident and full-filled, having enjoyed an enriching curriculum at St. Joseph's. We want us to approach our curriculum with enthusiasm and a thirst for knowledge. Through a broad, diverse curriculum and for children to develop new interests and passions. Children need a world class education which enables them to grow in wisdom, knowledge and a skills so that they may have a transformational impact upon society. We want children to receive an exceptional curriculum by inspirational, knowledgeable teachers who deliver academic excellence for all. We want our curriculum to enable long-term learning.

'Create Responsible Citizens who are independent, confident, life-long learners who are equipped to meet the challenges of a changing future…'

We want our children to grow up to be responsible citizens and good people. We want them to learn to feel, think and act with respect for themselves and for other people. We want them to feel confident and to develop a strong character whilst providing them with the necessary skills to meet the challenges of a rapidly changing world.

We want our children to leave St. Joseph's with the knowledge, skills and desires to contribute to a fairer and more sustainable world - To help build God's Kingdom. We want them to be successful global learners: As Pope Francis said,

'We are a single family living in a common home. We have a responsibility as stewards of God's earth.'

INTENT

Our young scientists will acquire life-long enquiry science skills, in order to explore and understand the world they live in, alongside the vast knowledge of the disciplines of biology, physics and chemistry. They will also develop an understanding of the vital role that major scientific ideas and scientists have played in society. In doing so, all our children, regardless of their starting points, will be fully prepared for their next stage of science education, and beyond.

Science is taught discretely, with a focus on substantive knowledge-rich content and the development of essential disciplinary knowledge. The National Curriculum programmes of study and Early Years Foundation Stage framework are fully adhered to and then supplemented with additional knowledge-rich content. This provides a coherent science curriculum that both prepares children extremely well for future learning and gives them the tools to independently investigate and explore the world further.

The science curriculum encourages children to be curious about natural phenomena and to be excited by the process of understanding the world around them. We want our children to remember the concepts they learn. Therefore, the curriculum focuses on the sequential development of essential substantive knowledge underpinning biology, chemistry and physics, as per the science progression map below. Over time, these building blocks of component learning are transformed into a deep understanding of the real world. Each year group deepens their understanding of key concepts, adding new generative knowledge to existing schema. For example, the biology strand of 'plants' is revisited multiple times throughout the year groups, with the component learning of basic plant structure in Class 1 transforming into the composite learning of water transportation within plants in Class 2.

Procedures and concepts that underpin scientific methods are developed through the systematic focus on disciplinary knowledge. Every unit of work contains opportunities to develop the Working Scientifically skills of asking questions, planning enquiries, observing, measuring, recording, presenting and interpreting results, drawing conclusions, predicting and evaluating, according to the progression in these skills as per the science progression map. Thus, essential science concepts are developed whilst children investigate the world around them. The different approaches to science enquiry, such as fair testing, research and classifying are also systematically developed in the disciplinary knowledge section of the progression map. Each science unit of work is then framed around an enquiry questions, ensuring a systematic, contextualised development of both substantive and disciplinary knowledge.

Understanding Different Types of Scientific Knowledge:

Substantive knowledge: sets out the subject-specific content that is to be learned - i.e. the National Curriculum units that can be separated into the disciplines of biology, physics and chemistry. *This is the knowledge of the products of science, such as concepts, laws, theories and models.* The progression map below, separated into biology, chemistry and physics, sequences the substantive knowledge from Reception to Year 6, drawing directly from the EYFS framework and National Curriculum.

Disciplinary knowledge: considers how substantive knowledge originates, is debated and is revised - *i.e. how we create, contest and evaluate substantive knowledge over time.* Disciplinary knowledge tells us how we know what we know; it is through disciplinary

knowledge that pupils learn the enquiry practices of science. It gives an insight into the ways that scientists think - how they ask questions, plan an enquiry, observe, measure, interpret, conclude, predict and evaluate. Disciplinary knowledge enables one to 'think like a scientist'. Disciplinary knowledge in science includes the *Working Scientifically* strand of the National Curriculum, and the key features of scientific enquiry as detailed in the 'aims' of the National Curriculum. Essentially, **Working Scientifically** skills and knowledge of approaches to **science enquiry** are distinct yet connected, and a particular lesson or sequence of learning is likely to incorporate elements of both.

The **Working Scientifically** strand of the National Curriculum includes:

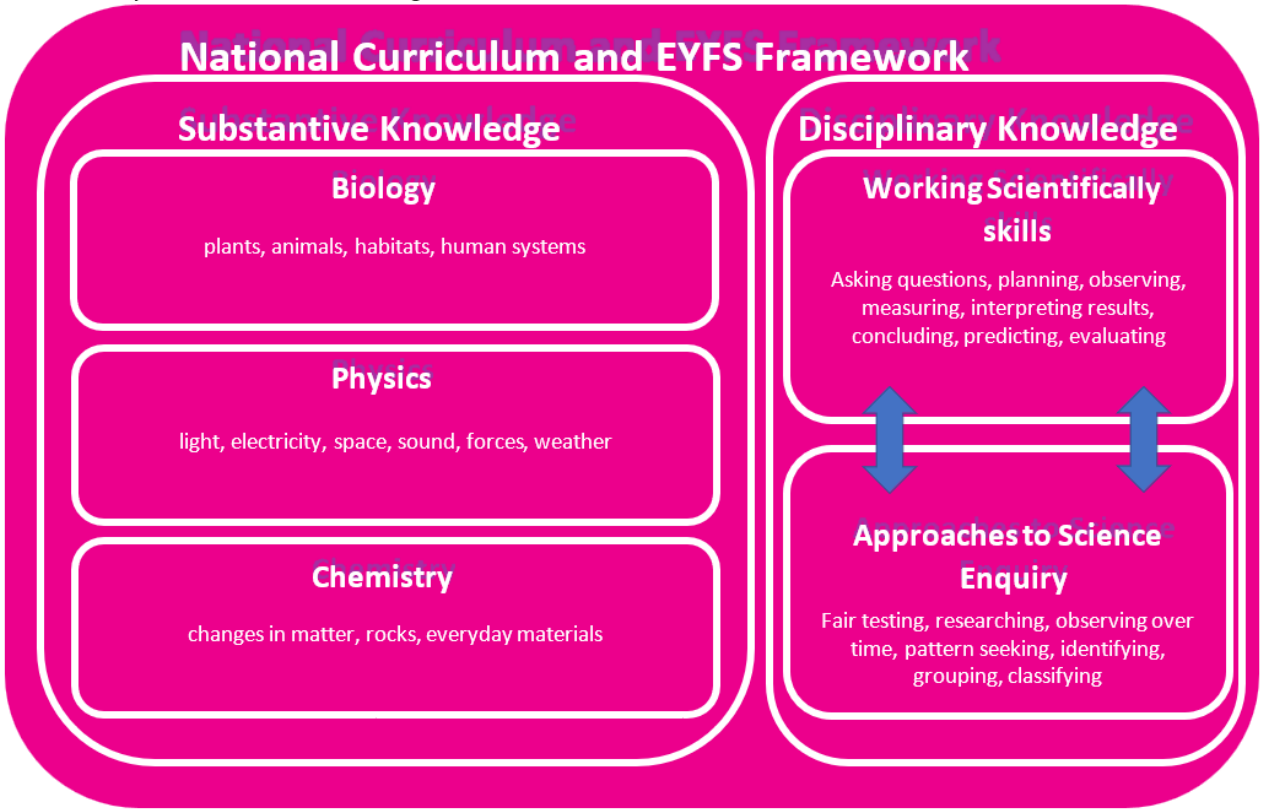
- *Asking Questions* that are the starting points for different types of science enquiry.
- *Planning Enquiries* that systematically require more independent decision making.
- *Observing Closely* and communicating these observations via increasingly more elaborate diagrams.
- *Taking Measurements* according to relevant age-related strands of the mathematics National Curriculum.
- *Recording Results* appropriately, using a variety of tables, tally charts and pictures.
- *Presenting Results* in a range of ways, including age-appropriate charts and graphs.
- *Interpreting Results* by spotting patterns and describing relationships.
- *Drawing Conclusions* and presenting them orally and in writing.
- *Making Predictions* about further results or investigations, by drawing on what has been learnt.
- Evaluating Enquiries by suggesting improvements and discussing the degree of trust in secondary sources and their results.

As well as the **Working Scientifically** skills, disciplinary knowledge in science also consists of the **different approaches that scientists employ in scientific enquiry,** in order to answer relevant scientific questions. These are noted in the 'aims' of the National Curriculum, and include:

- *Observing over time*, over a range of different spans of time - in the moment and over a longer period of days, weeks or months.
- *Pattern seeking*, including the use of scatter graphs in UKS2.
- *Identifying, classifying and grouping*, by working with Venn diagrams, Carrol diagrams and branching databases.
- *Comparative and fair testing* (controlled investigations), by controlling variables, presenting data in graphs and describing causal relationships.
- *Researching using secondary sources,* presenting what is found and using it to answer enquiry questions.

Acquiring disciplinary knowledge is an important curriculum goal and occurs alongside substantive knowledge development. The science enquiries integrate both forms of knowledge. Disciplinary knowledge is introduced, developed and mastered alongside the substantive content of biology, physics and chemistry.

The Relationship of Different Kinds of Knowledge in Science



IMPLEMENTATION

3D Curriculum

This is a term that we use at St .Joseph's which defines the way we have planned our History curriculum. It is a curriculum that promotes remembering. Our philosophy is that knowledge can't empower if it is forgotten. So as well as planning a rich curriculum with high quality material, we have also structured it in a way that makes remembering almost inevitable.

Using our long term 3D curriculum plans, leaders will then:

Create a medium plan for each unit of work, highlighting the vertical, horizontal and diagonal links across subjects and year groups to create a memorable curriculum.

Vertical: 'high-yield' concepts deliberately constructed within a subject that are encountered across year groups (for example, the concept of *power and rule* : this can be explored through learning the role of the monarchy in Early Years through to Year 6 learning of how Henry VIII used his power to shape the justice system during his rule)

Horizontal: Links between subjects, commonly known as 'cross-curricular' (for example, *invasion*: in Class 3 History, the Viking *invasion* of England; in Class 3 Science, microbes *invaded* bodies; in Class 3 P.E. *invasion* games. Subject leaders work hard to ensure that horizontal links reinforce learning across the curriculum.

Diagonal: Concepts connected across both year groups and across subjects; these are our Golden Threads which weave throughout our curriculum both across subjects and year groups

Diagonal Curriculum Golden Threads

Our curriculum has been designed to give children key knowledge about their identity and their place in the world. Children need to know how modern-day society has been shaped and the impact they can have in the future. Through our curriculum we ensure that children are ready for the next stage of their learning journey.

We help children to achieve our aims through our key knowledge threads:

- Diversity
- Identity
- Community
- Sustainability
- Equality

Teachers will also plan the following for each unit:

- A knowledge organiser which outlines knowledge (including vocabulary) all children must master;
- A cycle of lessons for each subject, which carefully plans for progression and depth;
- A low stakes quiz which is tested regularly to support learners' ability to block learning and increase space in the working memory;

- A 'thinking square', which outlines key concepts/ideas in the learning journey to provide a baseline of current understanding and misconceptions; this will be at the start of a unit;
- Trips and visiting experts who will enhance the learning experience;

Landing Points (Planning for Progression)

Within our 3D long term plan, in order to ensure that understanding is deepened each year, in relation to the vertical links, we have developed landing points. For each vertical link, landing points set out the typical expectations for knowledge and skill development at set times.

Landing points are an invaluable tool in helping teachers to ensure progression within every national curriculum subject. They allow us to set ambitious, challenging learning goals that support pupils to develop mastery. Our curriculum is our progression model; if pupils are moving through our curriculum as expected, we are confident that they are exposed to challenging learning goals.

IMPACT:

The successful approach at St Joseph's results in a fun, engaging, high-quality science education that provides children with the foundations and knowledge for understanding the world. Our children love Science!

Children will know more, remember more and understand more about the curriculum. Children retain prior-learning and explicitly make connections between what they have previously learned and what they are currently learning.

All children will have:

- . A wider variety of skills linked to both scientific knowledge and understanding, and scientific enquiry/investigative skills
- . A richer vocabulary which will enable them to articulate their understanding of taught concepts
- . Confidence and a love of learning for all things science

Adapting the curriculum for pupils with SEND in science

- Adaptive teaching takes place.
- For sensory or physically impaired pupils, science learning may necessitate enlarging texts, using clear fonts, using visual overlays, or audio description of images.
- Dyslexic pupils may benefit from well-spaced print.
- Teachers identify and break down the components of the subject curriculum into manageable chunks for pupils who find learning more difficult, particularly those with cognition and learning needs. These may be smaller 'steps' than those taken by other pupils to avoid overloading the working memory.
- A variety of additional scaffolds may be used in lessons, such vocabulary banks, additional visual stimuli or adult support.