



Saint Thomas More Catholic Primary School

Science Policy

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Signature of Headteacher	

St Thomas More Catholic Primary School

Science Policy

Introduction

Jesus Christ said, 'Let the children come to me, do not hinder them.' (Matthew 19:14). As a Catholic school it is our mission to educate pupils in such a way that no matter what their abilities or background they may reach their full potential as human beings. We thus seek to overcome any hindrance that might prevent any pupil accessing the fullness of the curriculum, opportunities and activities we offer.

Intent

We believe in the view of science outlined in the National Curriculum: "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 behave, and analyse causes."

In the Early Years Foundation Stage, children develop their skills as scientists through their use of characteristics of learning: playing and exploring, active learning and creating and thinking critically. They develop curiosity, using their sense to explore the world around them and learn through taking a risk and "trial and error". They are challenged to think of new ideas and find ways to solve problems. They are encouraged to notice patterns through experimentation, making predictions and testing their ideas. They explore similarities and differences in materials and living things.

At Key Stage 1, children are encouraged to experience and observe phenomena, looking more closely at the natural and humanly-constructed world around them. They ask and answer questions using different types of scientific enquiry, including observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests and using secondary sources of information. They use simple scientific vocabulary and communicate their ideas in a variety of ways, including drawings and simple tables.

At Key Stage 2, children will develop a deeper understanding of a wide range of scientific ideas. They will develop their skills of working and thinking scientifically, exploring and then selecting the most appropriate ways to answer science questions using scientific enquiry, including the principles of fair testing. Pupils are encouraged to draw conclusions based on

data and observations and to justify their ideas, using scientific knowledge and understanding to explain their findings. They will communicate their ideas in a range of ways. During this stage, children will begin to recognise that scientific ideas change and develop over time.

At St Thomas More Primary School we acknowledge that science is a core subject in the school's curriculum. We aim:

- to provide a rich and stimulating scientific provision that will foster a fascination and interest in science;
- to support a sense of scientific curiosity and the development of appropriate levels of knowledge and understanding;
- to enable children to understand and care for the world God has given them;
- to encourage discussion of scientific ideas, and the ability to question and justify using appropriate scientific language;
- to encourage children to collect information from various sources, compare results/findings with others;
- to be able to evaluate and interpret data;
- to provide experiences, which will enable children to use and develop an understanding of the nature, process and methods of science through a range of scientific enquiry processes, and to make predictions and conclusions based upon observations and experiments.
- to use equipment safely and sensibly;
- to develop potential scientific links with all other areas of the curriculum;
- to develop scientific knowledge and conceptual understanding through specific disciplines of biology, chemistry and physics.
- to become equipped with the scientific knowledge required to understand the uses and implication of science, today and for the future.
- To promote the development of STEM skills, making links with design and technology, maths and engineering, and future career pathways.

Science provides opportunities to promote:

- spiritual development through pupils sensing the natural, materials and physical world they live in, reflecting on their part in it, and exploring questions such as when does life start and where does life come from;
- moral development through helping pupils see the need to draw conclusions from observations and evidence rather than preconceptions and prejudice, and through discussion of the implications of the uses of scientific knowledge, including the recognition that such uses can be both beneficial and have harmful effects;
- social development through helping pupils to recognise how the formation of opinion and the justification of decisions can be informed by experimental

evidence, and drawing attention to how different interpretations of scientific evidence can be used in discussing social issues;

- cultural development through helping pupils recognise how scientific discoveries and ideas have affected the way people think, feel, create, behave and live, and drawing attention to how cultural differences can influence the extent to which scientific ideas are accepted, used and valued.
- vocational development through highlighting how science can be used positively to care for the natural and human world, signposting particular vocations where science plays a role.

Science provides opportunities for pupils to develop the key basic skills of:

- Communication: Speaking and listening, reading and writing, through finding out and communicating facts, ideas and contexts in a variety of contexts;
- Application of mathematics: through measuring, collecting, presenting (through a range of graphs, keys etc), considering and analysing first and second-hand data;
- Information technology, through the use of a range of IT equipment and applications, to research, gather data and present conclusions;
- Collaborative learning – working within groupings and in pairs to carry out scientific enquiries and to share findings,
- Improving their own performance, through the use of effective learning behaviours and reflecting on what they have done, identifying areas of success and next steps for learning;
- Evaluating what they have achieved;
- Problem solving, through finding ways to answer scientific questions with creative solutions.
- STEM subjects – science, mathematics, engineering and technology (design technology).

Structure and Pedagogy

Our science curriculum has been designed to follow the National Curriculum objectives and to ensure the National Curriculum's 'working scientifically' skills are taught and revisited regularly.

In Key Stage 1 and Key Stage 2, each year group teaches 30 science lessons, 10 per term, in a specific science exercise book. In these lessons, children will learn their year group's objectives and will apply their year group's 'working scientifically' skills. To ensure this, we have a detailed 'Progression of Science Skills' document and a comprehensive 'Science Learning Objectives' document. These have been designed to ensure that both knowledge and skills are spiralled throughout each child's science learning journey at St. Thomas More.

To enable our children to develop a deep understanding of science, our curriculum has been designed to not simply cover objectives, but to do so in a way which facilitates opportunities for children to work at an 'advanced' and 'deep' level. Our learning intentions overview not only gives opportunities for consolidation for those that need it, but also allows for children to demonstrate a deep understanding of the scientific knowledge and to apply their enquiry skills in a variety of contexts.

A long-term plan ensures all the National Curriculum units are covered in sufficient depth, with links being made to other subjects where appropriate, including extended writing, maths, geography and history.

Where relevant, our long-term plan incorporates elements of COVID catch-up, where units which were untaught during periods of lockdown have been reassigned to ensure full coverage of the National Curriculum.

Early Years Foundation Stage

The Early Years Foundation Stage Framework outlines the requirements for provision for children in Nursery and Reception class. The early foundations of science process and enquiry skills can be found in the "Characteristics of effective learning", as outlined in the document: Development matters in the Early Years Foundation Stage. The most relevant statements for science are taken from Communication and Language, Personal, Social and Emotional Development and Understanding the World.

Specific science skills of observation, pattern seeking, learning about living things and the environment, similarities and differences, objects and materials are addressed in the specific area: Understanding the world: The world.

A range of adult-led and child-led activities, based on play and exploration help pupils to develop early science skills. Activities, where possible, will be guided by the interests of pupils and theme.

Key stage 1

The Key Stage 1 curriculum has been designed to follow a two-year cycle: Cycle A and Cycle B. 'Materials' and 'Seasonal Changes' are taught within both cycles, being taught in different ways with different learning intentions in each cycle. This approach allows for each child to receive several lessons per objective throughout their time in Key Stage 1, with each lesson designed to approach the learning intention in a different way – this allows for a rich and varied

provision and gives children who require additional support extra opportunities to learn the content, whilst giving able learners opportunities to work at a greater depth.

During year 1 and 2, pupils are taught the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- Asking simple questions and recognising that they can be answered in different ways
- Observing closely, using simple equipment
- Performing simple tests
- Identifying and classifying
- Using their observations and ideas to suggest answers to questions
- Gathering and recording data to help in answering questions

Programme of study includes:

- Living things and their habitats
- Plants
- Animals, including humans
- Everyday materials and their uses
- Seasonal changes
 - Statutory requirements are detailed in the National Curriculum 2014

Lower key stage 2

During years 3 and 4, pupil are taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- Asking relevant questions and using different types of scientific enquiries to answer them
- Setting up simple practical enquiries, comparative and fair tests
- Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions

- Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- Identifying differences, similarities or changes related to simple scientific ideas and processes
- Using straightforward scientific evidence to answer questions or to support their findings.

Programme of study includes:

- Plants
- Animals, including humans
- Rocks
- Light
- Forces and magnets
- Living things and their habitats
- States of matter
- Sound
- Electricity
 - Statutory requirements are detailed in the National Curriculum 2014

Upper key stage 2

During years 5 and 6, pupils are taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- Using test results to make predictions to set up further comparative and fair tests

- Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations
- Identifying scientific evidence that has been used to support or refute ideas or arguments

Programme of study includes:

- Living things and their habitats
- Animals, including humans
- Properties and changes of materials
- Earth and Space
- Forces
- Evolution and inheritance
- Light

Programmes of study are delivered in a variety of ways. Across each unit of work, a range of opportunities are provided for scientific enquiry approaches to be applied. Enquiry types are planned to ensure that they are appropriate to the subject content being delivered and that they are all covered across the units.

Staff are supported in the teaching of science by following advice and guidance from the subject leader, including CPD provided on the planning of science. Teachers are provided with updates on expectations for teaching science through a number of different ways including the long term plans, the learning intention overview, science planning folders, examples of greater depth work, the use of unit markers and feedback from book scrutiny/learning walks.

Health and Safety

This section outlines the health and safety requirements for teachers when delivering practical science lessons:

When working with tools, equipment and materials, in practical activities and in different environments, including those that are unfamiliar, pupils should be taught:

- About hazards, risks and risk control;
- To recognise hazards, assess consequent risks and take steps to control the risk to themselves and others;
- To use information to assess the immediate and cumulative risks;

- To manage their environment to ensure health and safety of themselves and others;
- To explain the steps they take to control risks.

Long term planning

A curriculum map for science is in place, created in conjunction with year groups. The subject map ensures coverage of the programme of study across the key stages and year groups. It is planned to ensure progression in subject content and to avoid repetition or neglect of objectives. The learning intentions overview outlines the learning objectives to be covered at particular points in the academic year, considering the deployment of particular resources. Teachers must refer to this when planning science.

Planning

- Lessons will match the learning intentions on the science learning intentions overview and will total 30 lessons in the academic year.
- Unit markers are used to signal all units (except 'Seasonal Changes in KS1' which is taught across the year).
- We use a range of planning resources, including the Engaging science scheme and online resources which are appropriate for curriculum coverage and progression. We also supplement planning ideas using Ogden Trust materials. Chris Quigley's 'Science Milestones' provide teachers with a range of lesson ideas and exemplifications of greater depth work. These also allow for teachers to see what the learning before and after their year group looks like, assisting with progression and pitch of learning.
- Science is delivered 10 times per term, 5 times per half term.
- Teachers should plan using the school's Teaching and Learning Model and accompanying flip charts/PowerPoints which show the objective from the learning intentions overview clearly. They should also set out the working scientifically outcome and key questions for each lesson. Key questions should take into consideration all learners and be adapted appropriately.
- Subject leader may request these flip charts/PowerPoints for monitoring purposes.

Resources

- Each year group has a 'Science Planning Folder' which has their year group's 'Milestones' and learning intentions overview.
- Science resources are kept in the resources and LKS2 learning room.
- Resources are kept in boxes, which are labelled.

- Science resources are audited and updated as required. Subject lead will invite teachers to request additional resources and these requests will be considered within the context of the science subject budget.
- Staff are responsible for returning resources to the resource cupboard and storing them in an orderly fashion so that they are available for other year groups. Staff should inform science lead of any equipment that needs replenishing in good time to allow for ordering.

Assessment

- Class teachers in Y1-Y6 assess each science unit on the 'Data Tracker' after it has been taught, using work in books and teacher assessment. This includes a separate assessment judgment for 'Working Scientifically'. Teachers assign a 0, 1, 2 or 3 for each child for their attainment in a given unit.
- 0 meaning 'working at a pre-year group level'; 1 meaning 'working towards the expected level', 2 meaning 'working at the expected level' and 3 meaning 'working at great depth'.
- Next step planning – EYFS.
- These assessments generate child attainment scores, unit attainment averages, and cohort averages, allowing for comparisons within and between year groups. The science lead will use science assessment data to identify trends and to feed back to teachers about their new cohort's strengths and weaknesses.

Displays

We feel that displays are important for:

- Use as an aid to teaching;
- Developing scientific language;
- Celebrating children's progress in learning;
- Use as a resources for children to refer to.

All classrooms should have a science display to accompany a topic. This should include relevant information referring to what children are learning about (knowledge) and what they are learning to do (skills). Key vocabulary should also be displayed.

Differentiation, adaption and meeting the needs of all learners (SEND and more able)

We believe that as teachers we should set high expectations and provide opportunities for all children to achieve, including boys, girls, pupils with a special education need or disability,

pupils from a range of social and cultural backgrounds and children with English as an additional language. We take specific action to respond to pupil's diverse needs in a variety of ways, including to not limited to:

- Adapting the learning in each science lesson to include and engage all learners;
- Creating effective and inclusive learning environments;
- Securing their motivation and concentration;
- Adapted questioning approaches;
- Providing equality of opportunity through teaching approaches;
- Using appropriate assessment approaches;
- Setting targets for learning

It is recognised that all children should be given opportunities to show what they know and can do. Recognising the differing abilities within a class means that a teacher must plan at a class, group and individual level. This involves:

- Using a range of teaching styles which match the experiences of all pupils within the class and begin to cater for different levels of ability.
- Matching tasks to meet pupil's needs.
- The use of IT to support learning, e.g., Clicker, talking tins, vocabulary support, laptops
- The use of pre- teaching to enable less able/EAL children to have additional access to vocabulary of concepts ahead of time to allow for greater understanding during class activities.

Various strategies are employed to allow pupils to achieve.

- Common tasks, which will expect different outcomes.
- Stepped tasks, with a common starting point but which aim to extend more able pupils.
- Grouping, in which pupils work on a task designed for that group.
- Different resources, same task, which modifies the amount of information given to some pupils.
- Independent learning - finding answers from a range of resources.
- Sentence starters, missing words and sentence stems.
- Use of Bloom's Taxonomy/ Depth of Knowledge question stems.

When planning lessons, teachers will use a range of the strategies (such as those listed above) to enable access for learners working below year group expectations. In addition, lesson content will also be adapted by teachers to provide access for children who are not yet able to access the year group content. Teachers will have a clear understanding of the pre-year group learning and the steps that build towards the year group objective by using the EYFS

framework and the 'Science Milestones', for example. Teachers will then incorporate these essential foundations into their lesson plans.

The structure of the science learning intentions overview has consolidation for less able learners built in. By having multiple lessons on NC objectives (where possible and appropriate) teachers can plan to cumulatively build upon understanding over two or even three lessons, instead of just one lesson per objective. This means teachers can plan different activities and tasks for different learning styles, and can give the time necessary to repeat information, thereby providing additional opportunities to build scientific knowledge and understanding.

This approach to covering the science curriculum also allows for more able learners to be consistently extended. By spreading an objective over multiple lessons, teachers can plan lessons that allow children to develop their learning and demonstrate a deep understanding, absorbing knowledge and demonstrating understanding in one lesson, and then going on to apply and explain in the next (while less able learners repeat or consolidate the learning from the first lesson).

Expectations

The below points should be clearly evidenced in children's books. The subject lead may use this criteria to help support with book looks and feedback.

- Children will have a specific science book.
- Unit markers to be stuck in the child's book at the beginning of the unit (except for 'Seasonal Changes' in KS1).
- Learning intentions are taken directly from the science learning intentions overview. Any alterations must be made in conjunction with the science lead.
- Work should be clearly dated and underlined.
- Presentation standards to match those set in maths, RE and English books.
- Use of worksheets should be limited and only used when they will promote learning, for example, writing frames for younger/less able children etc.
- Diagrams should be drawn in pencil.
- Images and data tables should be neatly trimmed and stuck into books carefully.
- When children are asked to collect data from enquiries, there should be a progression in how the tables are produced, with the aim that in upper key stage two children will be able to produce their own data tables.
- Photographs of science activities may be added to books, with children providing a written response about the activities and what they have learned.
- A range of activities should be evident, including opportunities for extended writing, research, links with maths and data handling, use of IT etc. Activities should be added to science books as a record of the pupil's learning.

- The school marking policy should be followed. Marking should be linked to the learning intention and marking codes should be used. During each unit of work, there should be some evidence of feedback marking, particularly for open-ended activities. This is not expected for each piece of learning.
- Spelling corrections should primarily focus on scientific vocabulary.
- All spelling, developmental and progressive marking responded to.