



Science Policy

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SCIENCE POLICY

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1. SUBJECT STATEMENT

Intent

At George Tomlinson, we encourage children to be inquisitive throughout their time at the school and beyond. The Science curriculum fosters a healthy curiosity in children about our universe and promotes respect for the living and non-living. We believe science encompasses the acquisition of knowledge, concepts, skills and positive attitudes. Throughout the programmes of study, the children will acquire and develop the key 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 apply their knowledge of science when using equipment, conducting experiments building arguments and explaining concepts confidently and continue to ask questions and be curious about their surroundings.

The 2014 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 enquires 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.

This supports our whole school priority: To ensure our ambitious curriculum offers a breadth and depth of knowledge, experience and skills to inspire a love of learning in all.

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 is taught in as a discrete subject.
- Through 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.
- Curiosity is celebrated within the classroom. Teachers create engaging lessons, using high-quality resources to aid understanding of conceptual knowledge and skills and assess pupils regularly to identify those children with gaps in their learning, so that all pupils keep up.

- We build upon the knowledge and skill development of previous years. As the children's knowledge and understanding increases, and they become more proficient in selecting, using scientific equipment, collating and interpreting results, they become increasingly confident in their growing ability to come to conclusions based on real evidence.
- *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 scientific topics.
- 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 of their surroundings by accessing outdoor learning and workshops with experts.
- Full use is made of learning opportunities in our Edible Playground, pond and school field.
- Children are offered a wide range of visits, trips and visitors to complement and broaden the curriculum. These are purposeful and link with the knowledge being taught in class.
- Teachers have high expectations that pupils will use scientific vocabulary to articulate scientific concepts clearly, linking with our whole school priority on oracy.
- Regular events, such as Science Week or project days, provide broader provision and the acquisition and application of knowledge and skills. These events often involve families and the wider community and other local schools.

Impact

At George Tomlinson we provide a fun, engaging, high quality science education that provides children with the foundations and knowledge for understanding the world. Our engagement with the local environment ensures that children learn through varied and first-hand experiences of the world around them. Frequent, continuous and progressive learning outside the classroom is embedded throughout the science curriculum. Through various workshops, trips and interactions with experts, children have understanding that science has changed our lives and that it is vital to the world's future prosperity. Children learn the possibilities for careers in science, as a result of our links with nearby secondary schools and connection with national agencies such as the STEM association. This provides children with access to positive role-models within the field of science from the immediate and wider local community. From this exposure to a range of different scientists from various backgrounds, all children feel they are scientists and are capable of achieving. Children at George Tomlinson enjoy science and this results in motivated learners with sound scientific understanding.

2. TEACHING AND LEARNING

Scientific knowledge and conceptual understanding

The programmes of study describe a sequence of knowledge and concepts. Pupils should be able to describe associated process and key characteristics in common language, but they should also be familiar with, and use, technical terminology accurately and precisely. They should build up an extended specialist vocabulary and teachers ensure that this is developed within each lesson and throughout each science topic. 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.

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 opportunities 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 – cognitively, socially and linguistically. At George Tomlinson science lessons provide a quality and variety of subject specific language to enable the development of children’s confident and accurate use of scientific vocabulary and their ability to articulate scientific concepts clearly and precisely. 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.

Planning and Resources

Each unit should have a medium term plan set out using the Science Planning template. The template sets out the scientific knowledge, vocabulary and conceptual understanding for each unit of study. The medium term plan should outline the Learning Intentions for each lesson, which should be drawn from the school’s science curriculum map. It also keeps a record of the opportunities that children have had to develop their skills of working scientifically. Both the scientific knowledge and conceptual understanding and the skills of working scientifically should be highlighted each time they are taught. This ensures that teachers deliver a knowledge-rich science curriculum with opportunities to develop their understanding of the nature, processes and methods of science.

Planning is a process in which all teachers are involved. Every teacher within a year group should be involved with the planning process.

An example of a completed medium term planning document:

Principles of Working Scientifically		
I can ask simple questions and recognise that they can be answered in different ways.	I can use simple equipment to observe closely.	I can perform simple tests.
I can identify and classify.	I can use my observations and ideas to suggest answers to questions.	I can gather and record data to help in answering questions.

Scientific Knowledge and Conceptual Understanding			
Animals Including Humans	Materials	Plants	Seasonal Changes
I can identify and name a variety of common animals, including fish, amphibians, reptiles, birds and mammals.	I can distinguish between an object and the material from which it is made.	I can identify and name a variety of common wild and garden plants, including deciduous and evergreen trees.	I can observe changes across the four seasons.
I can group animals according to what they eat.	I can identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock.	I can identify and describe the basic structure of common flowering plants, including trees.	I can observe and describe weather associated with the seasons and how day length varies.
I can identify and name a variety of common animals that are carnivores, herbivores and omnivores.	I can describe the simple physical properties of a variety of everyday materials.		
I can describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)	I can compare and group together a variety of everyday materials on the basis of their simple physical properties.		
I can identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.			

Scientific resources are kept in a central store where they are labelled and easily accessible to staff. There is also a supply of science topic books and access to laptop computers and tablets to support children's individual research. We have established links with nearby secondary schools in order to provide children with access to fully equipped science laboratories.

Organisation

Science is planned and arranged into topics. It can also be linked to a wider Project Based Learning unit. Science should be taught once a week throughout the course of a half-term and must include at least one practical lesson.

These topics will be covered for each year group						
Year 1	Animals (The Human Body)	Animals (Mammals, Birds, Reptiles, Fish, Insects)	Everyday Materials	Plants (Basic Structure)	Plants (Deciduous and Evergreen Plants)	Seasonal Changes
Year 2	Uses of Everyday Materials	Animals Including Humans	Living Things and Their Habitats		Plants	Animals Including Humans (Keeping Healthy)
Year 3	Forces and Magnets	Animals Including Humans (Classification of animals. Musculoskeletal system)	Rocks	Plants	(Light	Animals Including Humans (Nutrition)
Year 4	Living Things and Their Habitats	Electricity	Sound	States of Matter	Animals Including Humans (The Digestive System, Teeth, Food Chains)	
Year 5	Earth and Space	Forces	Properties and Changes of Materials		Animals Including Humans	Living Things and Their Habitats
Year 6	Evolution and Inheritance	Electricity	Light		Animals Including Humans	Living Things and Their Habitats

EYFS:

Science is delivered through the various strands of the EYFS curriculum. As they develop their communication and language skills, children express and connect ideas and recount experiences. As they develop physically, children learn about health and self-care. They learn to make sense of the 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.

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.

Pupils should read and spell scientific vocabulary at a level consistent with their increasing word reading and spelling knowledge at Key Stage 1.

Lower Key Stage 2:

The principal focus of science teaching in Lower Key Stage 2 is to enable pupils to broaden their scientific world 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 way of answering them, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative and fair tests and find 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 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.

Pupils should read and spell scientific vocabulary correctly and with confidence using their growing word reading and spelling knowledge.

Upper Key Stage 2:

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 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.

Pupils should read, spell and pronounce scientific vocabulary correctly.

3. EQUAL OPPORTUNITIES

All children have equal opportunities to reach their full potential across the Science curriculum, regardless of their race, gender, cultural background, and ability, or of any physical or sensory difficulties.

4. INCLUSION

English as an additional language (EAL)

Children who are new to English are supported by the family liaison officer to learn relevant vocabulary in advance. Pupils are also explicitly taught scientific vocabulary within the context of their science lessons. Vocabulary and phrases with pictorial cues may also be taken home to support in-class learning. Teachers also use strategies such as giving EAL learners thinking time to process, using gestures, scaffolded talk and differentiated questioning to support EAL learners.

SEND

Some children experience learning differences which affects their progress in science. Class teachers inform the SENCO and Inclusion Manager if they are concerned that a child may have underlying learning differences. The child is observed and assessed, sometimes by outside agencies and support is put in place (see SEND Policy). See above for the list of interventions the school offers.

5. ASSESSMENT

Children’s progress is continually monitored throughout their time at George Tomlinson Primary School 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. We also draw on the non-statutory requirements to extend our children and provide an appropriate level of challenge.

Children receive effective feedback through teacher assessment (both orally and written) in line with the success criteria of each lesson. Children are guided towards achievement of the main objective through the use of process-based success criteria. Children will refer to these in their lesson and use them to identify areas of difficulty.

Assessment for learning is continuous throughout the planning, teaching and learning cycle. **KWL grids** allow pupils to activate prior knowledge, develop a purpose for learning through interests and summarise what they have learned. ... This allows them to monitor their learning and identify any knowledge gaps.

KWL grid

Topic:

What I think I already know about this is ...	What I want to know about this is...	What I have learnt about this is ...

At the end of each unit, teachers assess children’s achievement against the national curriculum and record it on Target Tracker. At the end of each science unit a short assessment task may be given to support teachers in their judgements.

6. THE ROLE OF THE SUBJECT LEADER

The role of the subject leader in Science is to coordinate the teaching of science across all phases of the school. This is in order to secure high quality science provision for every child, including outstanding teaching and learning, effective use of resources and the highest standards of achievement for all.

Some key duties that the Science subject leader should undertake over the course of the year include:

- Monitoring of Science books
- Learning walks and other lesson observations where necessary
- Planning and organising science enrichment opportunities and competitions
- Helping identify and facilitate the professional development needs of staff
- Liaising with SLT to help implement school improvement priorities
- Liaising with the school SENDCo to best support children with SEND needs in science provision
- Organising, maintaining and cataloguing resources
- Keeping abreast of new initiatives in the teaching of science
- Establishing and maintaining links with other schools and the wider community