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# Science Policy





## Science Policy

### Aims

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.

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.

### **Scientific knowledge and conceptual understanding**

The programmes of study 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, and/or 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. They should build up an extended specialist vocabulary. They should also 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.

### **The nature, processes and methods of science**

'Working scientifically' 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 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 (controlled investigations); and researching using secondary sources. Pupils should seek answers to questions through collecting, analysing and presenting data. '

### **Teaching and learning style**

We use a variety of teaching and learning styles in science lessons. Our principal aim is to develop children's knowledge, skills, and understanding. Sometimes, we do this through whole-class teaching, while at other times, we engage the children in an enquiry-based research activity and we have ensured on the medium-term plan that there are multiple opportunities for the children to take part in investigation-based lessons. We encourage the children to ask, as well as answer, scientific questions. They have the opportunity to use a variety of data, such as statistics, graphs, pictures and photographs. They use ICT in science lessons because it enhances their learning. They take part in role-play and discussions, and they present reports to the rest of the class. They engage in a wide variety of problem-solving activities. Wherever possible, we involve the pupils in real scientific activities, e.g. investigating a local environmental problem, or carrying out a practical experiment and analysing the results.

We recognise that in all classes, children have a wide range of scientific abilities, and we ensure that we provide suitable learning opportunities for all children by matching the challenge of the task to the ability of the child. We achieve this in a variety of ways:

- setting tasks which are open-ended and can have a variety of responses;
- setting tasks of increasing difficulty;
- grouping children by ability and setting different tasks for each ability group;
- providing resources of different complexity, matched to the ability of the child.
- Differentiating expectations for the children's evaluations of the sessions or investigations, they take part in.

## **Science Curriculum Planning**

Science is a core subject in the National Curriculum. The school uses the National Curriculum objectives as the basis of its planning.

We carry out our curriculum planning in science in three phases (long-term, medium-term and short-term). The long-term plan maps the scientific topics studied in each term during the Key Stage. This is worked out in conjunction with our scheme of work (Collins, Snap Science and Cornerstones 'Love to Investigate'). We aim to combine the scientific study with work in other subject areas where appropriate particularly where the theme focus is STEM based.

Our medium-term plans are based on the school's scheme of work (Collins, Snap Science Cornerstones 'Love to Investigate'). The Science Co-ordinator's Team has an overview of the topics which are being studied.

The class teacher is responsible for using the weekly lesson, which is provided by Collins and Cornerstones (short-term plans). These plans list the specific learning objectives and expected outcomes of each lesson. The class teacher then highlights the lesson plan to make the Science leader aware of how the lesson was taught and adds a brief lesson evaluation. The class teacher keeps a copy of these plans as well as submitting a copy to SMT in the individual schools agreed process.

The topics in science are planned so they build on prior learning. We ensure that there are opportunities for children of all abilities to develop their skills and knowledge in each unit, and we also build progression into the science scheme of work, so that the children are increasingly challenged as they move up through the school.

## **The Early Years Foundation Stage**

We teach science in reception classes as an integral part of the topic work covered during the year. As the reception class is part of the Early Year's Foundation Stage of the National Curriculum, we relate the scientific aspects of the children's work to the objectives set out in the Early Learning Goals (ELGs) which underpin the curriculum planning for children aged three to five. Science makes a significant contribution to developing a child's understanding of the world, e.g. through investigating what floats and what sinks when placed in water.

## **The Contribution of Science to Teaching in Other Curriculum Areas**

### **English**

Science contributes significantly to the teaching of English in our school by actively promoting the skills of reading, writing, speaking and listening. Some of the texts that the

children study in English may be of a scientific nature. The children develop oral skills in science lessons through discussions (e.g. of the environment) and through recounting their observations of scientific experiments. They develop their writing skills through writing reports and projects and by recording information.

### **Mathematics**

Science contributes to the teaching of mathematics in a number of ways. When the children use weights and measures, they are learning to use and apply number. Through working on investigations, they learn to estimate and predict. They develop accuracy in their observation and recording of events. Many of their answers and conclusions include numbers.

### **Personal, social, health and citizenship education (PSHCE)**

Science makes a significant contribution to the teaching of PSHE and citizenship. This is mainly in two areas. Firstly, the subject matter lends itself to raising matters of citizenship and social welfare. For example, children study the way in which people recycle material and how environments are changed for better or worse. Secondly, the subject gives children numerous opportunities to debate and discuss. Science thus promotes the concept of positive citizenship.

### **Spiritual, moral, social and cultural development**

Science teaching offers children many opportunities to examine some of the fundamental questions in life, e.g. the evolution of living things and how the world was created. Through many of the amazing processes that affect living things, children develop a sense of awe and wonder regarding the nature of our world. Science raises many social and moral questions. Through the teaching of science, children have the opportunity to discuss, for example, the effects of smoking, and the moral questions involved in this issue. We give them the chance to reflect on the way people care for the planet, and how science can contribute to the way in which we manage the Earth's resources. Science teaches children about the reasons why people are different and, by developing the children's knowledge and understanding of physical and environmental factors, it promotes respect for other people.

### **Science and ICT**

ICT enhances the teaching of science in our school significantly, because there are some tasks for which ICT is particularly useful. It also offers ways of impacting on learning which are not possible with conventional methods. Data loggers may be used to assist in the collection of data and in producing tables and graphs. Children use ICT to record, present and interpret data, to review, modify and evaluate their work, and to improve its presentation. Children learn how to find, select, and analyse information on the Internet and on other media.

### **Science and Inclusion**

At our school, we teach science to all children, whatever their ability and individual needs. Science forms part of the school curriculum policy to provide a broad and balanced education to all children. Through our science teaching, we provide learning opportunities that enable all pupils to make good progress. We strive hard to meet the needs of those

pupils with special educational needs, those with disabilities, those with special gifts and talents, and those learning English as an additional language, and we take all reasonable steps to achieve this

When progress falls significantly outside the expected range, the child may have special educational needs. Our assessment process looks at a range of factors - classroom organisation, teaching materials, teaching style and differentiation - so that we can take some additional or different action to enable the child to learn more effectively. This ensures that our teaching is matched to the child's needs.

Individual education plans (IEP) are created for children with special education needs. The IEP may include, as appropriate, specific targets relating to science.

We enable all pupils to have access to the full range of activities involved in learning science. Risk assessments are carried out for any activity which could pose a risk.

### **Assessment for Learning**

Teachers will assess children's work in science by making informal judgements during lessons. On completion of a piece of work, the teacher assesses it, and uses this assessment to plan for future learning. Written or verbal feedback is given to the child to help guide his/her progress. Older children are encouraged to make judgements about how they can improve their own work.

The new scheme of work has a built-in formative assessment throughout. It supports teachers in tracking progress, recording judgements and providing evidence of learning. The teacher uses this information as the basis for assessing the progress of each child. Alongside this, teachers will also complete a summative assessment of the children after each unit of work, which is generally every half term.

Teachers make an assessment of the children's work in science at the end of Key Stage 1. There are no longer any national tests in Science at the end of Key Stage 2, however some schools may be sampled using these tests at the end of Year 6. We report the teacher assessments at the end of Year 6.

### **Resources**

We have sufficient resources for all science teaching units individual schools and across the Trust. We keep these in central stores, where both general science resources and unit specific ones can be accessed. All libraries contain a good supply of science topic books and there is computer software to support children's learning. The science lead will also look at units in advance to identify any resources that need to be supplied. This is done for the teachers to allow lessons to take place regularly with a full range of appropriate resources.

### **Health and safety**

In this subject, the general teaching requirement for health and safety applies. We teach children how to follow proper procedures and to use resources appropriately and follow guidelines given.

## **Monitoring and review**

It is the responsibility of the individual schools subject leader to monitor the standards of children's work and the quality of teaching in science. The subject leader is also responsible for supporting colleagues in their teaching, for being informed about current developments in the subject, and for providing a strategic lead and direction for science in each school. Individual subject leaders give the school Heads/Executive Principal an annual summary report in which she/he evaluates strengths and weaknesses in science, and indicates areas for further improvement. The subject leaders have specially-allocated time for fulfilling the vital task of reviewing samples of children's work both in their individual schools and across the Trust, visiting classes to observe science teaching and meeting as a group of science leaders to review Science teaching across the Trust.

This policy will be reviewed at least every three years.