Stower Provost Community School

Curriculum drivers

The curriculum is underpinned by the school's Curriculum Drivers: Engage, Develop, Innovate and Express. The spiritual, moral, social and cultural development of our pupils and their understanding of the core values of our society are woven through the curriculum.

Science Curriculum Statement

Ownership	LB
Created	October 2021
Approved by Governors	
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To be reviewed	

Contents

1. Curriculum Statement

Intent

The 2014 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 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.

At Stower Provost, 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. This is informed by the national curriculum and builds towards identified phase 'end points' in accordance with NC expectations. Key skills are also mapped for each year group and are progressive throughout the school. These too ensure systematic progression to identified skills end points which are in accordance with the Working Scientifically skills expectations of the national curriculum - this is designed to ensure that children are able to acquire key scientific knowledge through practical experiences; using equipment, conducting experiments, building arguments and explaining concepts confidently. Cross curricular opportunities are also identified, mapped and planned to ensure contextual relevance. Children are encouraged to ask questions and be curious about their surroundings and a love of science is nurtured through a whole school ethos and a varied science curriculum.

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 will be taught in carefully planned and sequenced lessons every week by the class teacher.

● Knowledge and vocabulary is checked throughout the project therefore ensuring that any 'gaps' in knowledge can then be filled. This ensures that teaching is informed by the children's starting points and that it takes account of pupil voice, incorporating children's interests wherever possible.

● Through our 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. This curiosity is celebrated within the classroom. Teachers use precise questioning in class to test conceptual knowledge and skills, and assess pupils regularly to identify those children with gaps in learning, so that all pupils keep up. Tasks are selected and designed to provide appropriate challenge to all learners, in line with the school's commitment to inclusion.

● We build upon the knowledge and skill development of the previous years. As the children's knowledge and understanding increases, 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 that skills are systematically 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 the projects.

● Teachers demonstrate how to use scientific equipment, and the various Working Scientifically skills in order to embed scientific understanding.

● Children are offered trips and visitors to complement and broaden the curriculum. These are purposeful and link with the knowledge being taught in class.

Impact

The approach at Stower Provost results in 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. Progressive learning outside the classroom is embedded throughout the science curriculum - children should develop the understanding that science has changed our lives and that it is vital to the world's future prosperity. Our science curriculum allows learners to reflect on the progress of scientific knowledge through history, and to realise it is an evolving and refining process. Children at Stower Provost should enjoy science and this results in motivated learners with sound scientific understanding.

2. **Teaching and Learning**

The science curriculum is mapped to ensure alignment with the national curriculum content and programme of study. The names of the science projects are matched to the national curriculum aspects, for example, Living things and their habitats and Earth and space. However, in Key Stage 1, the aspect of Animals, including humans has been separated so that children study humans before expanding to explore animals.

Key knowledge relates directly and builds towards the achievement of end of phase (KS1, Lower KS2 and upper KS2) 'end points', informed by the National Curriculum statements. Key skills are also mapped so that these are developed systematically and align directly to the specified working scientifically statements as outlined in the NC for each phase.

In each lesson, children are guided towards the learning intention which is then reviewed at the end of the lesson. They are subsequently used by the teacher during the assessment and review work of children's work and are used to identify individual target areas. A working wall will be used to support and celebrate learning throughout each unit of work. This will also be used to support the acquisition of key knowledge and will support the accurate use of an extended specialist vocabulary.

To ensure excellence across the school in the teaching and learning of science:

● Children are encouraged to ask their own questions and be given opportunities to use their scientific skills and research to discover the answers. This curiosity is celebrated within the classroom.

● Teachers ask a range of questions which enable all children to take part, listening carefully to answers and taking learning forward, using open and closed questions and allowing children time to think.

● Planning involves teachers creating engaging lessons, often involving high-quality resources to aid understanding of conceptual knowledge.

● Teachers use precise questioning in class to test conceptual knowledge and skills, and assess pupils regularly to identify those children with gaps in learning, so that all pupils keep up.

● New vocabulary and challenging concepts are introduced through direct teaching. This is developed through the years, in keeping with the projects.

● Working Scientifically skills are embedded into lessons and these focus 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 opportunity to seek answers to questions through collecting, analysing and presenting data.

● The key knowledge for each project and across each year group is mapped across the school and checked at the end of each science project.

● 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 through learning outside the classroom.

● 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. Children 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.

3. **Assessment**

Lessons are planned to ensure that key knowledge is developed over time, over the course of each science block and in the correct sequence. Key knowledge is reviewed by the children and rigorously checked and consolidated by the

teacher at the end of each unit of work. Lessons within each project are also planned to ensure the systematic development of the key identified skills across the school.
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 through written feedback. Children are guided towards achievement of the main intention provided by and explained by the teacher. Children refer to this during the lesson and it predicts outcomes of work in children's books. Ongoing assessment also includes:
● Observing children at work, individually, in pairs, in a group, and in classes.
● Questioning, talking and listening to children
● Considering work/materials/investigations produced by children together with discussion about this with them.
In EYFS, we assess the children's Understanding of the World according to the Development Matters statements.

4. **Planning and Resources**

Key knowledge and skills, in line with the National Curriculum, are mapped on the whole school 'Science Knowledge and Skills Progression Map'; this shows the key knowledge and skills of each project and how they build through the school. The school's own context is also considered and opportunities for learning outside the classroom, including the use of specific school resources and relevant educational visits, are included on the map and are planned by teachers.
Cross curricular links are also mapped to further support the contextual relevance of the science curriculum. The science projects are sequenced to develop both children's substantive and declarative knowledge, and if possible, make meaningful links to other projects. For example, in Year 3, the projects Plant Nutrition and Reproduction and Light and Shadows are taught alongside the design and technology project Greenhouse and the art and design project Beautiful Botanicals. These links allow for children to embed their substantive knowledge in new and often real-life contexts.
The sequencing of the projects ensures that children have the substantive knowledge and vocabulary to comprehend subsequent projects fully. Each project's place in the year has also been carefully considered. For example, projects that involve growing plants or observing animals are positioned at a suitable time of year to give children the best possible opportunity to make first-hand observations. Within all the science projects, disciplinary knowledge is embedded within substantive content.
High-quality science resources to support the teaching of all projects from EYFS to Y6, are used; these are kept in a central store and are labelled and easily accessible to all staff. As well as these, the EYFS class has a range of resources for easy access to children during exploration. The library contains a rich and varied supply of science topic books to support children's individual research and all classes have access to these during their weekly allocated library slot.

5. **Organisation**

Within the academic year, children study science weekly, in most cases, as outlined in the overall curriculum framework overview. This allows children to enhance their scientific knowledge and develop working scientifically skills through gradually throughout the duration of each half term.
Key Stage 1
In Year 1, children start the autumn term with Everyday Materials, linking this learning to the design and technology project Shade and Shelter. In the Human Senses project, they learn about parts of the human body and those associated with the senses. In the spring project Seasonal Changes, they learn broadly about seasonal changes linked to weather, living things and day length. They revisit some of this learning in the following summer term project Plant Parts. They finish with the project Animal Parts, linking back to their knowledge about body parts and senses and identifying commonalities. In Year 2, children begin the autumn term with the project Human Survival, learning about the survival needs of humans, before expanding to study animals within their habitats in the project Habitats. Building on learning from Year 1, children learn about the uses of materials in the spring project Uses of Materials and begin to understand changes of materials through simple physical manipulation, such as bending and twisting. The spring Plant Survival project also explores survival, with children observing what plants need to grow and stay healthy. Finally, in the project Animal Survival, children bring together learning from the autumn term, thinking about what animals need to survive.

Lower Key Stage 2

Having learned about human body parts, the senses and survival in Key Stage 1, children now focus on specific body systems and nutrition in Key Stage 2. In the autumn term of Year 3, they learn about the skeletal and muscular system in the project Skeletal and Muscular Systems. This learning again links to other animals, with children identifying similarities and differences. Children also learn about healthy diets alongside the autumn term design and technology project Cook Well, Eat Well. In the spring term, properties of materials are revisited in the project Forces and Magnets, with children identifying magnetic materials and learning about the non-contact force of magnetism. They also begin to learn about contact forces, investigating how things move over surfaces. Science learning about rocks and soils is delivered through the geography project Rocks, Relics and Rumbles. Children begin to link structure to function in the summer Plant Nutrition and Reproduction project, identifying the plant parts associated with reproduction and water transport. Children finish the year with the project Light and Shadows, where they are explicitly introduced to the subject of light, with children learning about shadows and reflections, revisiting language from Key Stage 1, including opaque and transparent.

In the autumn term of Year 4, children learn about the digestive system, again making comparisons to other animals, in the project Digestive System. The second autumn term project Sound introduces the concept of sound, with children identifying how sounds are made and travel. They learn and use new vocabulary, such as pitch and volume, and identify properties of materials associated with these concepts. In the spring term project States of Matter, children learn about solids, liquids and gases and their characteristics. They understand how temperature drives change of state and link this learning to the project Misty Mountain, Winding River, in which children learn about the water cycle. Up to this point, children have had many opportunities for grouping and sorting living things. In the spring project Grouping and Classifying, children recognise this as 'classification' and explore classification keys. Finally, in the summer term, children study electricity by creating and recording simple circuits in the project Electrical Circuits and Conductors. They also build on their knowledge of the properties of materials, identifying electrical conductors and insulators.

Upper Key Stage 2

In the autumn term of Year 5, children broaden their knowledge of forces, including gravity and air and water resistance, in the project Forces and Mechanisms. They revisit learning from design and technology projects, including Making It Move and Moving Mechanisms, to explore various mechanisms and their uses. Their knowledge of gravity supports the autumn term project Earth and Space, so they can understand the forces that shape planets and our solar system. They also develop their understanding of day and night, first explored in the Year 1 project Seasonal Changes. Having learned that animals and plants produce offspring in earlier projects and studied plant and animal life cycles in Sow, Grow and Farm, children now focus on the human life cycle and sexual reproduction in the spring term project Human Reproduction and Ageing. In the summer term project Properties and Changes of Materials, children revisit much of their prior learning about materials' properties and learn new properties, including thermal conductivity and solubility. To this point, children have learned much about reversible changes, such as melting and freezing, but now extend their learning to irreversible changes, including chemical changes.

In Year 6, the final body system children learn about is the circulatory system and its roles in transporting water, nutrients and gases in the autumn term project Circulatory System. Science learning about classification is delivered through the spring term geography project Frozen Kingdoms. In the spring term, children also build on their knowledge about electrical circuits from Year 4, now learning and recording standard symbols for circuit components and investigating the function of components and the effects of voltage on a circuit in the project Electrical Circuits and Components. In the summer project Light Theory, children recognise that light travels in straight lines from a source or reflector to the eye and explain the shape of shadows. Finally, in the project Evolution and Inheritance, children learn about inheritance and understand why offspring are not identical to their parents. They also learn about natural selection and how this can lead to the evolution of a species.

6. **EYFS**

The teaching of science in EYFS is in accordance with the EYFS national framework. Science in the EYFS is covered in Understanding the World area of the EYFS Curriculum. It is introduced indirectly through activities that encourage every child to explore, problem solve, observe, predict, think, make decisions and talk about the world around them. Here at Stower Provost, we encourage the children to explore creatures, people, plants and objects in their natural environment. They will observe and manipulate objects and materials to identify differences and similarities. They

will also learn to use their senses, for example feeling dough or listening to sounds in the environment such as sirens or farm animals. They will make observations of animals and plants and explain why some things occur and talk about changes. The children will be encouraged to ask questions about why things happen and how things work, they will also be asked questions about what they think will happen to help them communicate, plan, investigate, record and evaluate findings. Children are guided to make sense of their physical world and 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.

7. **KS1 and KS2**

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. At Stower Provost, children are encouraged to be curious and ask questions about what they notice. Their understanding of scientific ideas is supported through the use of different types of scientific enquiry so that children can 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. Children are supported to 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, including wider school forums such as science week. Most of the learning about science is done through first-hand practical experiences, and children are also to begin to use appropriate secondary sources, such as books, photographs and videos.

'Working scientifically' is described separately in the National Curriculum programme of study, but is always taught through and clearly related to the teaching of substantive science content in the programme of study. The knowledge and skills progression maps outline how the specific skills of each unit progressively build between years and towards the overarching 'end point statements'. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.

Opportunities are provided for the children to 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 view of the world around them. They 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. Children are encouraged and supported to ask their own questions about what they observe and make some decisions about which types of scientific enquiry are likely to be the best ways of answering them, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative and fair tests and finding things out using secondary sources of information. They draw simple conclusions and use some scientific language, first, to talk about and, later, to write about what they have found out.

As in KS1, 'Working scientifically' is described separately in the National Curriculum programme of study, but is always taught through and clearly related to the teaching of substantive science content in the programme of study. The knowledge and skills progression maps outline how the specific skills of each unit progressively build between years and towards the overarching 'end point statements'. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.

Opportunities are provided for the children to 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. At Stower Provost, children 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 encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. Children are also supported to begin to recognise that scientific ideas change and develop over time. The school curriculum provides opportunities for children to 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. Children learn to 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 and thinking scientifically' is described separately at the beginning of the programme of study, but must always be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content. Opportunities are provided for the children to read, spell and pronounce scientific vocabulary correctly

8. **Equal Opportunities**

At Stower Provost Primary school, we are committed to providing a teaching environment which ensures all children are provided with the same learning opportunities regardless of social class, gender, culture, race, special educational need or disability. Teachers use a range of strategies to ensure inclusion and also to maintain a positive ethos where children demonstrate positive attitudes towards others.

9. **Inclusion**

Science teaching considers the needs of different individuals and groups for learners and tasks are designed and differentiated as appropriate to ensure an appropriate level of challenge. Supporting adults are also deployed effectively to ensure focussed support where this is necessary.
Teachers use a range of inclusion strategies, including paired work, open questions and direct, differentiated questioning and the activation of prior knowledge and contextual learning. This support the inclusion and motivation of all learners ensuring that optimum progress is made throughout each part of the lesson.

10. **Role of the Subject Leader**

The Science lead will:
● Ensure the high profile of the subject and provide a strategic lead and direction for science in the school.
● Maintain and ensure use of the central supply of science resources, in accordance with those specific to each year group and project
● Support colleagues in their teaching of science and support the CPD of others
● Ensure progression of the key knowledge and skills identified within each unit and that these are integral to the programme of study and secure at the end of each age phase.
● Monitor books and ensure that key knowledge is evidenced in outcomes, alongside and as supported, by SMT
● Monitor planning and oversee the teaching of science
● Lead further improvement in and development of the subject as informed by effective subject overview
● Ensure that the science curriculum enables the progress and raises the attainment of all pupils, including those who are disadvantaged or have low attainment
● Ensure that the science curriculum take account of the school's context, promotes children's pride in the local area and provides access to positive role models from the immediate and wider local area to enhance the science curriculum.
● Establish and maintain existing links with external agencies and individuals with specialist expertise to enrich teaching and learning in science.

The subject leader should have specially allocated time for fulfilling the task of reviewing samples of children's work, training, and liaising with other subject leaders from other schools.

11. **Parents**

Parental input is highly valued and parents are regularly invited and welcomed into school to share their own expertise with the children. Enquiries from parents and members of the school community with specialist expertise and knowledge are also encouraged. The school will actively seek to establish collaboration with parents and carers who are able to support the teaching and learning of science at Stower Provost.
The support that parents and carers provide in supporting their children at home with project based, creative curriculum homework is also recognised and valued.