

WALFORD NURSERY & PRIMARY SCHOOL



Policy

on

SCIENCE

Reviewed and Updated: November 2021

Date for Review: November 2022

Walford Nursery & Primary School Science Policy

At Walford Nursery & Primary School, we understand the crucial role we have in teaching children about the world in which they live. It is our intent that this learning will equip them for life beyond the classroom and as global citizens.

As science links direct to practical experience with ideas, it can engage learners at many levels. It intends to stimulate a child's curiosity in finding out why things happen in the way they do. It teaches methods of enquiry and investigation to stimulate creative thought and knowledge. Children learn to ask scientific questions and develop an understanding of natural phenomena. Through science, children understand how major scientific ideas contribute to our lives. The development of science skills and knowledge is important in preparing all pupils for citizenship in a technological world where they can question and discuss science based issues that may affect their lives, the direction of society and the future of the world.

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.

Science teaches an understanding of natural phenomena. It aims to stimulate a child's curiosity in finding out why things happen in the way they do. It teaches methods of enquiry and investigation to stimulate creative thought. Children learn to ask scientific questions and begin to appreciate the way in which science will affect the future on a personal, national, and global level.

INTENT

At Walford Nursery & Primary School, children will:

- develop an everyday application of scientific knowledge in the world around them;
- undertake a range of activities which take place in and out of the classroom to engage children about the world around them;
- develop knowledge of different aspects of Science: Biology, Chemistry and Physics;
- develop a respect for all living things and the environment and an understanding of their interdependence;
- promote the learning of skills and knowledge, understanding and key vocabulary through a scientific attitude to the solving of problems;
- develop the skills of experimenting, devising and carrying out investigations and testing hypotheses by means of fair tests;
- communicate and record information following practical observations;
- promote confidence in the safe use of appropriate scientific equipment;
- use computing skills to collect, display and analyse data;

- encourage the ability to make predictions and suggest explanations based on an understanding of the world around them and scientific knowledge;
- develop an ability to understand and interpret scientific information presented in verbal, mathematical, diagrammatic or graphic form.

The Curriculum Organisation

Teaching and learning in Science follows the outline programmes of study and level descriptors prescribed by the New National Curriculum for Key Stage 1 and 2. In our curriculum, Science is taught both as a discrete subject and within an integrated topic approach, linking it with other areas of the curriculum such as English, Maths and PSHE/RSHE.

Staff will actively look for opportunities to ensure the cross-curricular aspect of work is evident.

The national curriculum for science aims to ensure that all children:

- 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.

The objectives of teaching science at Walford Nursery & Primary School also enable children to:

- ask and answer scientific questions;
- plan and carry out scientific investigations, using equipment (including computers and iPads) correctly;
- know and understand the life processes of living things; physical processes and materials and their properties;
- evaluate evidence, and present their conclusions clearly and accurately.

This is the knowledge and understanding gained at each stage:

By the end of EYFS, children will:

- have had an opportunity to make sense of their physical world and their community through opportunities to explore, observe and develop their knowledge and sense of the world around them;
- develop the crucial knowledge, skills and understanding that help them make sense of the world;
- engage in activities based on first-hand experiences that encourage exploration, observation, problem solving, prediction, critical thinking and decision-making and discussion;
- experience a wide range of activities, indoors and outdoors, including adult focused, child-initiated and independent play;
- be stimulated, interested and curious;

- observed by adults and learning is recorded in a variety of ways.

By the end of Key Stage 1, children will:

- experience and observe phenomena, looking more closely at the natural and humanly constructed world around them;
- be encouraged to be curious and ask questions about what they notice;
- 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;
- 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;
- carry out first-hand practical experiences;
- use appropriate secondary sources, such as books, photographs and videos to support their learning;
- work scientifically;
- read and spell scientific vocabulary at a level consistent with their increasing wordreading and spelling knowledge at key stage 1.

By the end of lower Key Stage 2, children will:

- enable pupils to broaden their scientific view of the world around them;
- explore, talk about, test and develop 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;
- 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;
- draw simple conclusions and use some scientific language, first, to talk about and, later, to write about what they have found out;
- work scientifically;
- read and spell scientific vocabulary correctly and with confidence, using their growing word-reading and spelling knowledge.

When working scientifically, by the end of lower Key Stage 2, children will:

- ask relevant questions and use different types of scientific enquiries to answer them;
- set up simple practical enquiries, comparative and fair tests;
- make systematic and careful observations and, where appropriate, take accurate measurements using standard units, use a range of equipment, include thermometers and data loggers;
- gather, record, classify and present data in a variety of ways to help in answering questions;

- record findings use simple scientific language, draw, label diagrams, keys, bar charts, and tables;
- report on findings from enquiries, include oral and written explanations, displays or presentations of results and conclusions;
- use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions;
- identify differences, similarities or changes related to simple scientific ideas and processes;
- use straightforward scientific evidence to answer questions or to support their findings.

By the end of upper Key Stage 2, children will:

- enable pupils to develop a deeper understanding of a wide range of scientific ideas;
- explore and talk about their ideas; ask their own questions about scientific phenomena; and analyse functions, relationships and interactions more systematically;
- encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates;
- recognise that scientific ideas change and develop over time;
- 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;
- 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;
- read, spell and pronounce scientific vocabulary correctly.

When working scientifically, by the end of upper Key Stage 2, children will:

- plan different types of scientific enquiries to answer questions, include recognise and control variables where necessary;
- take measurements, use a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate;
- record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs;
- use test results to make predictions to set up further comparative and fair tests;
- report and present 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;
- identify scientific evidence that has been used to support or refute ideas or arguments.

IMPLEMENTATION

What does our Science Curriculum look like?

Please refer to:

- our **Long Term Plan**, which demonstrates the progression of knowledge and skills within the whole school Science offer;
- our **Medium Term Plan** for each year group, which maps teaching and learning, knowledge and skills through a topic;
- our **Curriculum Map**, which details each year group / subject;
- our **Knowledge Organisers**, which summarise the key knowledge and skills to be acquired and retained during a Science topic.

Teaching and Learning

At Walford Nursery & Primary School, we use a range of teaching and learning strategies to develop children's knowledge, skills and understanding in Science and all other subjects. The teaching of the Science curriculum is organised in the following ways:

- knowledge and understanding taught in blocks of work with a new topic each term/half term;
- where possible links made with other subjects to enrich learning.
- opportunities each term for children to develop their investigative skills focusing on a different aspects of enquiry;
- incorporate the use of technology where appropriate;
- at least one practical lesson every three weeks;
- teachers use TAs to help support children when needed;
- pre-teaching of scientific vocabulary at the start of each topic so it can be used in the following lessons;
- providing a range of engaging resources to enable the children to carry out fun and exciting experiments to deepen their learning and develop their understanding of the concept that is being taught;
- opportunities for paired, group and class discussion/debate to consolidate learning.

Teaching and Learning in Science is supported by:

- a range of practical equipment / resources, artefacts, visual and reference aids;
- additional resources loaned from various outside agencies and libraries;
- in each key stage, we give children the opportunity to participate in trips and enrichment activities;
- we encourage visitors to come into the school and talk about their experiences of Science in real life contexts. We recognise and value the importance of stories in Science teaching and we regard this as an important way of stimulating interest in Science and giving a relevant context to learners;
- ICT including Internet and DVDs.

The teaching of Science will vary and will be most appropriate to the planned learning outcomes of the lesson.

Children will be taught and will work:

- as a whole class;
- in groups (sometimes differentiated by ability);

- in pairs or as individuals.

Inclusion

Walford Nursery & Primary School is an inclusive school, and we aim to ensure that every child is offered the opportunity to achieve their full potential, no matter what their needs may be. All children, regardless of race or gender, shall have the opportunity to develop their scientific capability. The school promotes equal opportunities and fairness of distribution of all resources.

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 progress. We do this by setting suitable learning challenges and responding to each child's needs. Assessment against the National Curriculum allows us to consider each child's attainment and progress against expected levels.

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 action to enable the child to learn more effectively. This ensures that our teaching is matched to the child's needs.

We enable children to have access to the full range of activities involved in learning science. Where children are to participate in activities outside the classroom, for example, a trip to a science museum, we carry out a risk assessment prior to the activity, to ensure that the activity is safe and appropriate for all children.

Adults will:

- plan a series of differentiated lessons which build on areas previously taught in other year groups that show progression;
- create a learning environment that supports learning and that engages children's interest in the topic being studied e.g. role play areas, interactive displays;
- engage the pupils through the use of engaging resources and use of media to carry out practical sessions;
- conduct regular book scrutiny's, pupil perceptions and planning checks;
- promote Science through enrichment activities, e.g., Planetarium visit;
- support, encourage, foster and nurture a love of Science;
- research innovative, engaging practice and new techniques; • undertake regular whole school professional development.

Children will be supported by:

- differentiated work, where appropriate, to ensure all children are able to meet the learning objective;
- small group/1:1 adult support, when required;
- extra time (pre-teaching) with learning the vocabulary for EAL and SEND pupils in order for them to join in with discussion.
- resources being checked to ensure they are safe and can be used with the children;
- the use of effective questioning;

- the use of teacher and self-assessment to quickly identify any child who requires additional support in specific areas. These pupils will then receive additional support or resources to use;
- the use of knowledge organisers to support learning;
- the use of key vocabulary within lessons;
- the use of retrieval activities e.g. Flash Back 4's and the Learning Ambassador Award.

Children will be challenged by:

- differentiated lessons;
- the use of effective questioning;
- giving children roles of responsibility during group activities and experiments;
- additional activities to stretch the learning within the lesson.

All children (including SEND / EAL) can access the curriculum by:

- pre-taught vocabulary/sessions, when appropriate (SEND or EAL);
- seating children alongside good role models who can provide additional support;
- providing visual/practical prompts;
- teaching lessons using a range of different techniques to appeal to different learning styles e.g. videos, drama, artefacts, texts etc.

The contribution of science to teaching in other curriculum areas

Cross-curricular teaching of Science

Science may be taught in a cross-curricular approach across a range of subjects in order to enhance the knowledge and understanding of the world nature of the subject. The teaching of scientific skills or knowledge may not always be through a 'Science' lesson.

English

Science contributes significantly to the teaching of English in our school by actively promoting the skills of reading, writing, speaking and listening. The children develop oral skills in science lessons through discussions and through recounting their observations. 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. The children use weights and measures and learn to use and apply number. Through working on investigations they learn to estimate and predict. They develop the skills of accurate observation and recording of events. They use numbers in many of their answers and conclusions. They develop their knowledge of statistics by creating tables, graphs and charts.

Computing

Children use computing skills in science lessons where appropriate. They use it to support their work in science by learning how to find, select, and analyse information on the Internet. Children use computing skills to observe, record, present and interpret data and to review, modify and evaluate their work and improve its presentation.

Personal, Social and Health Education (PSHE) and Citizenship

Science makes a significant contribution to the teaching of personal, social and health education. 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 people recycle material and how environments are changed for better or worse. Secondly, children benefit from the nature of the subject in that it gives them opportunities to take part in debates and discussions. Science promotes the concept of positive citizenship.

Relationships, Sex and Health Education (RSHE)

There are strong links with RSHE and the school uses the Jigsaw programme to deliver these aspects of the curriculum in line with the Science curriculum.

Spiritual, Moral, Social and Cultural Development

We are constantly looking for ways to promote and embed Values in all our teaching and learning. Science teaching offers children many opportunities to examine some of the fundamental questions in life, for example, 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. They have the chance to reflect on the way people care for the planet and how science can contribute to the way 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 and for the planet we live in.

British Values

Individual liberty of own views, **tolerance** and **mutual respect** of others views is taught through the topics where different views / ethics are involved. This includes the topics of evolution. **Rule of law** relates to:

- *Children following rules for the safety of all.*
- *Understanding of the need to have speed limits (speed, force, change of momentum).*
- *Alcohol, tobacco and illegal drugs.*
- *Practical activities in science require children to engage in **team work** and show **mutual respect** for each other.*
- ***Democracy** is taught through student debates on different issues, e.g., examining issues such as whether smoking and drinking should be made illegal.*

- *Resilience and self-esteem are developed through children building independent learning skills, experiencing getting answers wrong, learning how to formulate the correct response and responding to target questions.*

IMPACT

Our Science curriculum facilitates sequential learning and long-term progression of knowledge and skills. Teaching and learning methods provide regular opportunities to recap acquired knowledge through high quality questioning, discussion, modelling and explaining to aid retrieval at the beginning and end of a lesson or unit of work. This will enable all children to alter their long-term memory and know more, remember more and be able to do more as geographers.

This is what you might typically see:

- engaged learners;
- children posing questions for research;
- children engaged in practical investigation to explore scientific phenomena;
- themed days to give the children the opportunity to learn about Science and the world around us in a meaningful context. Children sharing their learning with others through contributing to a display;
- children discussing, reflecting and sharing their learning.

This is how we know how well our pupils are doing:

- lessons are planned based on scientific skills which are specific for each year group;
- marking and feedback by teacher and peers;
- observations of children during investigation and exploration;
- photographic and video evidence;
- EYFS floor books;
- displays of work in classes;
- assessment tracked at the end of each term;
- book scrutiny, pupil perceptions and planning audits.

This is the impact of the teaching:

- children who enjoy Science;
- inquisitive learners;
- reflective learners;
- children who are able to demonstrate a variety of scientific skills;
- children who are prepared to share what they've learnt in a variety of ways;
- confident children who can talk about their Science lessons and discoveries they've made;
- children who are able to use and explain the meaning of scientific vocabulary;
- children who are prepared to take risks;
- children who are able to gain an insight into the world they live in.

Assessment

Assessment is an integral part of the teaching of Science. Children's work is assessed through observations and informal judgements against the lesson objective.

On completion of a piece of work, the teacher marks and comments as necessary.

At the start of every lesson, children will complete retrieval activities, 'Flashback 4'.

At the end of a lesson, children will demonstrate their learning by completing a NIKI (Now I Know It) evaluation. The teacher makes a summary judgement about the work of each child and this will be used as basis for assessing the progress of the child at the end of the year. Formative assessment takes place in each lesson and is used to inform the next step in teaching and learning.

Written or verbal feedback (in line with school marking policy) is given to help guide children's progress and is used to support teaching and learning and inform future planning. The teacher assesses the children's progress based on their achievement of the learning objectives in lessons. Children are encouraged to assess their own learning through self-assessment. Feedback on attainment to parents will be given during end of year reports. Formative assessment enables teachers at the end of units of work to make a judgment against age related expectations (ARE) – above ARE, at ARE or below ARE – this judgment is recorded on a subject specific excel spread sheet / SIMs.

At Walford Nursery & Primary School, we strive to ensure that our children have a thirst for knowledge and an exceptional grasp of basic skills. Children are judged by the criteria, 'Knowing more, remembering more and being able to do more'. Therefore, we have developed a Learning Ambassador programme to aid children's retrieval practice. Children will have the opportunity to complete quizzes to test and revise their knowledge of previous and new learning.

Strategic Leadership of Science

Day-to-day responsibility for the delivery of the Science curriculum rests with class teachers. The Science Leader is responsible for developing the school strategy for Science, taking into account opinions expressed by all members of the school community, particularly classroom-based staff. This development is also informed by external factors and influences such as being the lead school for the South Herefordshire Science Hub alongside the Ogden Trust.

The Science Leader is ultimately responsible to the Headteacher and governing body in whose hands, all final decisions on strategy rest.

Monitoring

Monitoring is carried out by the Headteacher, a member of senior management or the Science Leader, in the following ways:

- informal discussion with staff and pupils (pupil voice);
- work sampling and book trawls;
- classroom observation;
- planning scrutiny.

Evaluation / Review

There is an annual review of this policy by the Science Leader. The leader will report to the governing body on the progress of the children in Science and will meet with the designated governor to discuss and monitor the success of the teaching in Science.

This policy was updated in November 2021. The policy was adopted by the Standards, Teaching & Learning Committee of the Governing Body of Walford Nursery & Primary School in November 2021 and will be monitored annually.

Signed: Chair of Standards, Teaching and Learning Committee

Signed: Headteacher