



Hartwell Primary School

Science Policy

Hartwell Primary is a Voluntary Controlled academy and, recognising its historic foundation, works to preserve and develop its religious character in accordance with the principles of the Church of England. This includes the active promotion of Christian and British values and the respecting of those of other faiths or none.

'Believe, Aspire, Grow'

Review date: Autumn 2022

Introduction

At Hartwell Primary School, we understand that through our Science curriculum, we can stimulate and excite our children's curiosity about the phenomena and events that are happening in the world around them. It links direct practical knowledge with ideas and can engage learners at many levels. Through science, pupils gain a range of transferable critical thinking skills and come to understand how major scientific ideas contribute to technological change, and how this can have an impact on industry, business and medicine. We are living in an increasingly scientific and technological world and we seek to prepare each child for the future.

Intent

At Hartwell Primary School, pupils are given appropriate learning opportunities so that they develop the skills needed to be active citizens within this increasingly scientific world. Science is a powerful and useful tool through which children's understanding of the world around them is carefully developed. It is our aim to create a challenging environment that raises standards of achievement in Science through high quality teaching and learning. Pupils build up their scientific skills and knowledge, developing the necessary ability to investigate, question and understand scientific concepts.

Aims and Objectives

- Help pupils to work scientifically involving:
 - observing 'real life' phenomena, including those that are **relevant to the them**.
 - gaining confidence and precision in asking and answering **their own questions** about the world around them.
 - designing of fair and controlled investigations.
 - drawing of meaningful conclusions through critical reasoning and the evaluation of evidence, leading to – where appropriate – further questions and evidence gathering.
- Give pupils a knowledge and understanding of scientific processes through purposeful 'hands on' experiences.
- Develop progressive knowledge and understanding of scientific ideas, facts and data deepened by the role of questioning in science.
- Foster concern for our environment.
- Establish an understanding of science skills in real contexts by the reading and construction of graphs, diagrams, charts and tables using accurate measurements and observations.
- Encourage imaginative and personally original thinking.
- Provide opportunities for each pupil to develop their skills in order to reach their potential.

Teaching and Learning

In every Science lesson, objectives and success criteria are shared with the children and their involvement and interaction is an integral part of our approach to teaching and learning. We use a variety of teaching methods including whole class, group and individual activities. The careful questioning skills of the teacher provide challenges for the children and support a well- paced lesson. Feedback is offered to children in a timely fashion, both verbally and in written form, and is used to promote deeper learning for each individual.

In all classes there are children of differing ability. This fact is recognised and suitable learning opportunities are provided for all children by matching the challenge of the task to the ability of the child. This is achieved through a range of strategies such as:

- Setting common tasks that are open-ended and can have a variety of results;
- Setting tasks of increasing difficulty where not all children complete all tasks;
- Providing a range of challenges through the provision of different resources;
- Using additional adults to support the work of individual children or small groups;
- Providing support where individual children have particular gifts or talents.

Science Curriculum Planning

Early Years Foundation Stage:

Science is encompassed in Knowledge and Understanding of the World and is planned and taught alongside other subjects in this area, for example design and technology. Science activities in the Foundation Stage help the way children's ideas are formed and focus on their observation and questioning skills. Children are encouraged to share their own ideas and explore them in a safe and secure environment discussing their findings as they work.

Key Stage 1:

The time allocations for Science in Key Stage 1 at Hartwell Primary School is one hour per week. During this time, pupils will observe, explore and ask questions about living things, materials and physical phenomena. They 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 are taught 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. Teachers predominantly use first-hand practical experiences to build up a body of key foundational knowledge and concepts

however this is complimented with the use of appropriate secondary sources, such as books, photographs and videos.

'Working scientifically' is taught through, and clearly, related to the teaching of substantive science content in the programme of study. The notes and guidance outlined in the National Curriculum are used as guidance by staff, to link scientific methods and skills to specific elements of the content.

Pupils read and spell scientific vocabulary at a level consistent with their increasing word-reading and spelling knowledge at key stage 1.

Key Stage 2:

The time allocation for Science in Key Stage 2 is two hours. During this time, pupils broaden their understanding of a wider range of living things, materials and physical phenomena. They apply their knowledge and understanding of scientific ideas to their investigation of the world around them, everyday things and their personal health. They carry out more systematic investigations, working both in groups and independently to ask their own questions about what they observe. They are encouraged to make some decisions about which types of scientific enquiry are likely to be the best ways of answering these questions, 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. Initially, they talk about their work and its significance using a wider range of scientific language, building up through the key stage to communicate through scientific writing, conventional diagrams, graphs, tables and a range of ICT.

As the pupils move into upper Key Stage 2 they are encouraged to ask their own questions and are supported to answer these in order to deepen their understanding of a wider range of scientific concepts, encountering more abstract ideas and they begin to recognise how these ideas help them to understand and predict how the world operates.

'Working scientifically' is taught through and clearly related to the teaching of substantive science content in the programme of study. The notes and guidance outlined in the National Curriculum are used as guidance by staff, to link scientific methods and skills to specific elements of the content.

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

Investigations:

At Hartwell Primary School we believe that investigation is the backbone of Science and therefore should be a core feature of all science topics. We have a whole school commitment to teaching AT1 and each class plans and carries out an investigation in every unit of work.

It is important that children do not have to relearn how to carry out an investigation each year, depending on each teacher's individual approach. To enable children to transfer skills from one year to the next, it is crucial that there is a standard approach to carrying out investigations. In addition to this, we can ensure that there is progression in skills from Year R to Year 6. An awareness of these skills means that we can effectively differentiate and meet the needs of all children in our school.

Types of Investigation:

Initially investigations may be modelled by the teacher with interaction encouraged from the children. This then progresses to an intermediate investigation. This incorporates opportunities for pupils to carry out elements of the investigation under the guidance of the teacher or another adult in a group situation. Finally, there are supported independent investigations where pupils lead the investigation.

Investigation Questions:

Recognising investigation questions that can or cannot be investigated is an important skill within Science AT1. Investigation questions can be used as an effective differentiation tool. There are easier questions that have a limited range of possible outcome: 'Which car goes the furthest, the small or large one?' or there are medium difficulty questions whose outcomes are again limited but require a greater depth of investigation: 'Which surface of ramp makes the car go furthest?' Finally there are the hardest level of questions that are open ended and may involve several variable being tested and evaluated: 'How is the height of the ramp related to the speed of the car?' As children become more skilled at designing and carrying out investigations, then they will progress through these types of investigation questions. Typically the hardest type of question would be encountered first in KS2 though this should be revised in the light of very able scientists in KS1 or less able KS2 children.

Investigation Planning Board:

From the very beginning of school, children should be familiar with the layout of our agreed format for planning an investigation. What does change is the vocabulary that we use to identify the key factors that are to be manipulated. By the end of Year 6, it is expected that children are confidently using appropriate terms such as 'independent factor' and 'control factor' instead of terms such as 'what is being changed'. Teachers are encouraged to use these terms much earlier than Year 6 but by using them alongside what they mean allows a firm understanding to develop. Each section of the planning board is represented by a different colour, which enables ease of recognition from Year R. The planning format should also feature in class displays during the school year when celebrating children's work.

Planning:

- All planning is prepared in advance of teaching and is saved on the T: Drive where it can be accessed by SLT and subject leads.
- Long Term Planning is based on the National Curriculum and supported by the Qualifications and Curriculum Authority's (QCA) scheme of work (for Key Stage 1 and 2). Teachers are expected to 'go beyond' QCA plans to further enrich the children's science experiences.
- Medium Term Planning is set for each year group and is planned on the school designed planning format.
- Short Term Planning is prepared on a weekly basis on the agreed planning format. These take into account the needs of the particular abilities within the class and work is differentiated to meet those needs. Short term planning clearly shows the learning objectives for that lesson, success criteria and differentiation in order for learning to take place for all pupils.
- Planning takes into account the high emphasis which the school places on the pupils' skills of working scientifically.
- Investigation is planned into each unit of work and these investigations are clearly highlighted in red on the Medium Term Plan.

Resources:

Hartwell Primary School has a wide range of resources to support the teaching of science across the school. Classrooms have a range of basic resources, with more specialised equipment being kept in shared storage areas. These areas are only accessible to pupils under adult guidance. The resources in the shared areas are stored in clearly labelled boxes so as to be easily accessible. These resources are the responsibility of the Science Co-ordinator who manage a yearly budget.

Role of the subject leader:

- To provide leadership and direction in Science.
- To promote high standards of teaching and learning.
- To bring new developments and ideas to the attention of the staff.
- To review, monitor and evaluate planning and to scrutinise standards of pupils' work.
- To evaluate standards achieved in Science.
- To monitor and evaluate pupil achievement in relation to targets across the school.
- To provide internal CPD for staff to ensure continuing professional development.
- To attend Science network meetings.
- To ensure relevant resources are available and used effectively.
- To write, review and evaluate the Science Development Plan which contributes to the School Development Plan.

Assessment and Monitoring

Assessment follows the guidelines in the Assessment Policy and is part of the school's self evaluation process. It is based on the appropriate levels of attainment and is linked to learning objectives and learning outcomes. Assessment is carried out to

- Monitor pupils' progress and achievements and ensure that individual pupil needs are being met.
- Identify strengths and weaknesses.
- Provide a foundation for strategic planning.
- Progress professional development through identified priorities.

At the beginning of each science unit, teachers look at the key skills and vocabulary of the medium term planning objectives which need to be incorporated into planning, adapting and differentiating activities for their own cohort.

- Ongoing assessments inform weekly planning.
- End of unit assessments assess pupils' learning against expectations on the school's agreed format.
- At the end of each Science unit teachers make an assessment judgment as to whether pupils are working towards the expected standard, working at the expected standard or working at greater depth within the expected standard
- Information from assessments is used to establish progress and identify where reinforcement of concepts is needed.

The Science Subject Leader monitors the planning and assessments. Monitoring is only effective when it is coupled with analysis and evaluation. A variety of different monitoring strategies will be used during the cycle of science monitoring. School needs for staff development, resources and assessment monitoring are linked in to the science development plan which is part of the whole School Development Plan.

Class teachers report on pupils' progress and attainment at parental consultations in the Autumn and Spring terms, as well as in their mid- year and annual reports to parents.

Cross Curricular Links:

- The Science curriculum has many strong links with other curriculum subjects, for example PE, DT, PHSE and Citizenship. All links are to be fostered and reflected in medium and short term planning. Opportunities for ICT are to be continually investigated and built upon by the Science coordinator and ICT coordinator, for example the use of Web Cameras, I-pad Apps or the TAG Microscope.

Examples of cross-curricular integration of science:

English:

- Styles of writing e.g. ingredients in recipes.
- Report writing on animals and environments.

Mathematics:

- Through the use of scales.
- Exploring patterns in data.
- Estimating and accurate measuring.
- Reading of graphs and tables.

Art and DT:

- Growing plants.
- Observational drawing.
- Food technology where equipment is used practically and the reading of scales is necessary.

History, Geography and RE:

- How animals are adapted to their environment.
- Conditions needed for plants and animals to survive.
- Seasons and climates.
- The water cycle.
- Life cycles of animals, plants and ourselves.
- Presentation of organic and non-organic substances.
- Space, sun, moon and planets.
- Collection and interpretation of statistical data.

P.E.:

- Pulse rates before and after exercise.
- Movements to show growth.
- The skeleton for movement, support and protection.
- Exercises to improve health.

Music:

- Vibrations.
- Investigations into sound insulation and conduction.
- Changes in pitch and level of sound.

Personal, Social and Health Education:

- Keeping healthy - eating the right foods.
- Drug awareness.
- Looking after our teeth.
- Safety in the environment.

British Values & Citizenship:

- Social skills learned through working together as a team.
- Developing an understanding of their environment.
- Respect for other people's beliefs and values.
- Taking responsibility for their own actions.
- Making choices about their health and well-being.

- Understanding the harmful aspects of some household products and medicines.

Inclusion

At Hartwell Primary School all pupils have equal access to all areas of the Science curriculum. A broad and balanced Science curriculum is the entitlement of all our pupils regardless of ethnic origin, gender, class, attitude or disability. Our aim is to support the less able and challenge the more able pupils so that they may all reach their potential.

Differentiation is planned into lessons to develop pupils' ability whatever their level. This may be in the form of additional differentiated resources, support from the class teacher or a teaching assistant, targeted questioning as well as the pupils working individually or in groups. Those pupils who are on the SEND register and have IEP's are supported and taught according to their individual needs.

Extra Activities, educational visits and visitors:

Visits and workshops are arranged throughout the year, to enhance and consolidate work in school. There are frequent visits by specialists from a range of disciplines, which help foster an awareness of healthy living and caring for the environment, as well as developing community links. Extra- curricular clubs such as gardening and Eco- club help to develop children's understanding of science concepts they have learnt about in class.

Health and Safety:

Staff ensure that pupils work in a safe manner at all times and in particular, are made aware of the importance of safety rules during scientific investigations.

Teachers must consider carefully the content of their lessons and where necessary must complete a risk assessment to minimize any dangers to themselves and their pupils.

All mains-powered electrical equipment in school undergoes regular safety checks.

Monitoring and Reviewing the Science Policy

The policy will be reviewed annually by the Science Subject Leader in consultation with the Staff, Headteacher and the Governors to ensure it meets the needs of every child at Hartwell Primary School.