
# Eleanor Palmer Primary School
# Science Policy

## Science at Eleanor Palmer

At Eleanor Palmer we believe that through the study of science, children develop a sense of the world and how it works. Science is a great tool of exploration and collaboration, and we want **all pupils** to know they are scientists who belong in the lab!

Our aim is for children to leave EP as keen scientists with both the knowledge to explain some of the scientific world, but also a strong sense of curiosity and wonder about it. Our young scientists will feel empowered because they have the tools with which they can plan, carry out and evaluate scientific experiments. They will be as comfortable with using hands-on experimentation as they are with carrying out secondary research to arrive at answers to questions about science, and will be able to make good choices about what type of investigation to carry out in order to pursue a line of enquiry. They will also be aware of some of the ethical problems that scientific discoveries and change bring about.

All year groups have specified science learning objectives which are outlined in our Long Term Plan (see appendix). These objectives are in line with the National Curriculum which states what year groups should cover. The sequence of knowledge we have designed from Early Years to Year 6 is set out in our science 'vertical' document. Because this knowledge is well structured, it is meaningful and becomes easier for children to remember and access over time. This knowledge can then be used to solve complex, and interesting, scientific problems without overloading working memory. Our ScienceVertical can be found at www.eleanorpalmer.camden.sch.uk/curriculum-and-ethos/subject-verticals/.

Science is taught throughout the year, every week and it is given much deeper focus in a term long science-led topic each year. For example, in Year 2, children study invertebrates in depth for the whole summer term, and in Year 5, they study the human body. Science-led trips and visitors exceed National Curriculum expectations and enrich learning.

## What principles underlie the teaching of Science at Eleanor Palmer?

**Knowledge is power –** Children need to develop scientific understanding by acquiring the necessary knowledge to explain what they have observed and investigated. Teachers explain what happened and why in every session and encourage children to explore this understanding by applying it in different ways or different situations. Even in Early Years classes our sessions are grounded in scientific knowledge of biology, physics and chemistry, for example, observing and learning about exoskeletons in invertebrates. We take the National Curriculum statements as the minimum requirement. For example, in Year 2 the teacher will deliver beyond the required labelling parts of a plant to explore different types of root, why some are bigger than others, why plants in arid areas might have deeper roots than others or why mangroves have such unusual root systems.

**Practical enquiry where possible –** "*Tell me and I will forget, show me and I may remember, involve me and I will understand."* Our teachers are confident enough to give children many and regular opportunities to work scientifically. Children use and apply investigative and practical skills in almost every Science session. Although in some instances the teacher may demonstrate

something, the vast majority of lessons involve children carrying out tests in pairs, threes and small groups. This hands-on experience reinforces and embeds what they have heard and seen.

**Collective curiosity –** We place emphasis on curiosity, questioning, and authentic enquiry as well as knowledge because we want children to develop a sense of excitement, ownership and curiosity about natural phenomena through observing and conducting a variety of experiments. This approach is informed by the Science Across the City research, 2020, by Bianchi, Whittaker and Poole: https://rb.gy/s5aan. In lessons this might look like witnessing the power of a chemical reaction by observing Alka Seltzer and water reacting within a canister as part of learning on 'states of matter', or mixing cornflour with water to make 'Oobleck' and exploring unusual properties of some liquids.

**Children make suggestions about what they test –** Achievement is high when children plan, carry out and evaluate experiments that they have, in part, suggested themselves and this is emphasised in the Ofsted document, 'A survey into science education in schools' (2010-2013). Children's decisions are based on previously acquired knowledge and teachers ensure that conceptual scientific understanding is reinforced, clarified and gained through experimentation, as reinforced by the Ofsted Science Review from 2021. Our children suggest areas they would like to learn more about and pose questions that develop an earlier test, e.g. having discussed the impact heat and air flow has on water evaporation, children might suggest putting bowls of water in locations around the school, predicting what they expect might happen. Teachers set up experiments that have this scope, and allow time for pupil planning and resource gathering so these tangents can be fully explored.

**We encourage questions –** We want our children to be able to ask challenging questions and will admit that we may not know the answer ourselves but can help to find out. We want to be part of the journey to finding out and will support learners in setting up investigations or carrying out research to help answer the questions they pose, e.g. having observed how sultanas behave in lemonade a child asks "Would dried blueberries behave the same way?" or "Do all dried fruits behave this way in fizzy drinks?", uncovering scientific explanations of the results - in this case, $CO_2$ bubbles form on the surface of the sultanas and allow them to float, building an understanding of floating and sinking.

**Children should talk and listen to one another –** We want our children to be active learners with the oracy skills to ask questions and talk about their learning. Science lessons should generate a buzz. Children will be actively engaged in discussions about concepts, might challenge statements and verbally work through new ideas to develop understanding. As part of our standard practice in science lessons, teachers actively seek out thoughts, opinions and misconceptions so these can be addressed and developed.

**Science is fun and engaging –** Although all our science teaching is grounded in knowledge and understanding we want our children to develop a sense of awe about their world. Teachers are encouraged to plan some 10 minute 'Wow Science' experiments each term. These are those experiments that can appear magical until the science behind them is explained. Why does water stay in a bucket swung around my head? How did I make an eggshell soft enough to push through the neck of a bottle?

**Visits are used to develop interest –** As in all areas of the curriculum we seek out visits to enhance learning. Children regularly go out to experience science beyond the lab and classroom. This might be seasonal walks to Hampstead Heath or Waterlow Park in KS1, a visit to the Royal Institution to learn about DNA in Year 5 or a practical session at the Royal Veterinary College in Year 6. Visits must be essential to the learning and linked to classroom lessons. We work with the outreach science team from the Francis Crick Institute and scientists from the Crick lead workshops for all of our classes.

**Disciplinary Knowledge at Eleanor Palmer**

We expect our teachers to use strategies to promote deep thinking in science by ensuring children use these 6 tools for scientific investigation across the year. It serves as a useful aide-memoire when planning activities across a unit, to ensure that all aspects of disciplinary knowledge are covered.


Children are taught which element of disciplinary knowledge that they are concentrating on in each lesson. They use their observations and results to draw conclusions, make predictions, suggest ideas and present scientific data in a variety of ways to help them answer their questions.

**The practicalities of science at Eleanor Palmer**

- Science is taught for the equivalent of an hour weekly, either in the classroom or our dedicated lab, which offers the children a space in which they see themselves as scientists and can access equipment to better develop disciplinary knowledge.
- Cross curricular links are made where effective for learning – for example gathering and analysing data using mathematical knowledge - or in links to history and geography topics, for example learning about scientific changemakers in Year 1 and inventors in Year 4.
- As appropriate to each lesson, science is recorded in Science, Technology and Engineering books, with work displayed and celebrated regularly.
- Science books are monitored half termly by senior and subject leaders.
- Teachers use a variety of adaptive teaching approaches to include and have ambition for all pupils: modelling, demonstration, use of internet links and video, experiments (both immediate and over time), research, discussion and debate.
- Teachers know the core knowledge which is essential for all children to know each year and return to this throughout each unit of work, quizzing and reinforcing.
- Topics are re-visited but expanded and developed as children move up the school.
- Groups are encouraged to communicate and record their findings in a variety of ways such as diagrams, posters, concept cartoons, mind maps, talk partners and group scribing.
- Home learning is used to support science where appropriate, through tasks such as finding answers to questions posed in school, research using books, the Internet and interviews with friends and family.
- Our EP Knowledge Organisers capture key concepts and vocabulary, and where they sit in pupils' learning journey across the school. These are used regularly in school and are sent home to ensure families can discuss science learning with their children.

## Inclusion

We use a variety of approaches and adapt tasks for all our pupils. These include:

- Groups are mixed in attainment to promote peer learning;
- We specifically identify and support children with learning barriers or who are having difficulty in understanding particular concepts or vocabulary, working with them in smaller groups or one to one;
- We plan so that children with systemic disadvantage which impacts their achievement in science, or those who need support with their wellbeing, have enrichment opportunities. For example, we have a gardener who works one to one or in small groups with these children.
- We have high quality resources, centrally stored, and we provide enough so that all children have access to hands-on experiences.

## Planning and Assessment

Teachers write detailed termly plans for science which are then discussed with the headteachers in the termly meeting. These plans outline the sequencing of objectives and activities. Teachers are guided by the vertical science curriculum plan, which ensures that scientific knowledge and skills are built upon year on year by clearly outlining a progression of topics and objectives, as well as science knowledge organisers.

Each science unit starts with an assessment activity to find out what children already know and understand. Planning will be adjusted or written in response to this task. 'Concept maps', brainstorms and quizzes are a great tool for assessing prior knowledge. We repeat the task at the end of the unit to see what children have learnt. We actively encourage the use of 'Concept Cartoons' (by Millgate House) and activities from Explorify to assess children's understanding of specific concepts, both to start and/or end a teaching session.

Formative assessment is carried out while a task is being completed - through discussion, specifically questioning between child and teacher. It can be carried out through observations of children working in groups or individually. Our questioning aims to help children learn by encouraging them to think critically about what they have achieved.

Parents are informed of science units and topics to be covered at the beginning of the term through the topic letter, and, for the term in which the class topic is science-led, through the EP Knowledge Organiser. There is an opportunity for parents to see work and discuss progress at the mid-year meeting, when progress in science is formally reported, and class teachers are always willing to show and discuss science at other times.

## Monitoring

Science in STEM books are monitored half-termly by the science lead and a member of the SLT. Feedback is given to individuals within a week of this 'book look' and general points are shared with the staff team. Book looks focus on progress over time, marking and feedback, a consistent school approach and policy to practice. They also inform discussion about how we teach and record science and how we can improve our practice.

Learning walks, joint planning between teachers and the science lead, and observations of science lessons are also important parts of our monitoring and school improvement process. The science lead is given dedicated time to manage these activities with a sharp focus on improving science teaching and learning across the school.

Monitoring is also carried out in partnership with a member of the Governing Body, and for the last eight years this has been Boris Telyatnikov. Governor monitoring occurs annually or as

identified in the School Improvement Plan (SIP) and generally involves pupil discussion groups with samples of children from Years 1-6 and a 'book look' to see links between policy and practice.

Feedback is written and presented to the Curriculum Committee. Reference is made to previous findings and developments so there is a record of progress over time. Records of these visits can be found in Curriculum Committee Minutes

**Appendix 1 - Grid of units**

Science- led, term-long topics, in which cross-curricular links are made, are in bold, and all other units are taught during weekly science lessons.

| | Autumn | Spring | Summer |
|---|---|---|---|
| Y1 | Materials | Plants | Animals, including humans<br>***Am I an animal?*** |
| | Seasonal change | | |
| Y2 | Uses of Everyday Materials | Plants | Living things and their habitats<br>Animals, including humans<br>***Incredible invertebrates*** |
| Y3 | Magnets and forces<br>Light | Rocks and soil | Plants<br>Animals, including humans<br>***How does your garden grow?*** |
| Y4 | States of Matter | Electricity<br>Sound<br>***Robots and inventions*** | Living things and their habitats<br>Animals, including humans |
| Y5 | Earth and Space | Properties and changes of materials<br>Forces | Animals, including humans<br>Living things and their habitats<br>***The human body*** |
| Y6 | Living things and habitats | Light<br>Electricity | Evolution and Inheritance<br>Animals, including humans<br>***Evolution*** |