Edna G Olds Academy
A L.E.A.D. Academy

Our Vision for Science at Edna G Olds Academy- Science Curriculum Statement

Intent

At Edna G Olds Academy, we aim to give every child a broad and balanced science curriculum which enables them to confidently explore and discover what is around them, so that they have a deeper understanding of the world we live in. We want our children to love science and develop a genuine curiosity about the world around us. We want them to have no limits to what their ambitions are and grow up wanting to be astronauts, forensic scientists, toxicologists or microbiologists. We want our children to remember their science lessons in our school, to cherish these memories and embrace the scientific opportunities they are presented with! To achieve this, we develop their understanding of nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them

Our aim is that these stimulating and challenging experiences help every child secure and extend their scientific knowledge and vocabulary, as well as promoting a love and thirst for learning. At Edna G Olds Academy, we have a coherently planned and sequenced curriculum which has been carefully designed and developed with the need of every child at the centre of what we do. We want to equip our children with not only the minimum statutory requirements of the science national curriculum but to prepare them for the opportunities, responsibilities and experiences of later life.

Science Implementation

Our science teaching is underpinned by our vision and principles shared with everyone. Key points we follow at Edna G Olds Academy:

● Reflective learning and questioning opportunities for all pupils building on their prior knowledge and providing cross-curricular links.

● An environment that encourages pupils to pose their own questions and suggest their own way of investigating their hypotheses to develop their ideas and independence.

● Key vocabulary and scientific pedagogical methods are used to challenge pupils and broaden their understanding.

● Nurturing and applying pupils' science learning to real-life experiences, making science meaningful and building the 'Science Cultural Capital'.

● Hands-on, practical experiences of working in a range of scientific methods to explore, inspire and foster pupils' natural curiosity.

● A creative, inclusive and stimulating science curriculum, enabling pupils to secure and extend their scientific knowledge and vocabulary.

At Edna G Olds Academy, science is taught in every year group, throughout the year. Topics are blocked to allow children to focus on developing their knowledge and skills, studying each topic in depth. Our topics are structured so that the children can work through the 3 key concepts of science: physics, biology and chemistry. All concepts are taught through scientific enquiry and develop a range of working scientifically skills. The Science Curriculum Progression document covers

key science subject knowledge and the Working Scientifically concepts: 1) Questioning and enquiry planning, 2) Observing and measuring, 3) Investigating, 4) Recording and reporting findings, 5) Identifying, grouping and classifying, 6) Researching, 7) Conclusions. Working scientifically processes and methods are embedded in lessons so that children learn to use a variety of skills to answer scientific questions / investigations and conduct enquiries. 'Working Scientifically' skills are built-on and developed throughout children's time at school, so that they can apply their knowledge of science when conducting experiments, making observations or predictions, explaining concepts and asking questions.

At the beginning of each new topic, the children complete a pre-learning research task, which ensures a clear starting point is made and enthuses the children about the topic. Prior learning related to the topic is made explicit to the children and referred to regularly throughout, in order to make meaningful links and embed the learning. Teachers use examples of natural things and phenomena, to generate discussion and facilitate the children to pose questions and think of possible lines of enquiry.

Scientific enquiry skills are embedded in each topic the children study and these topics are revisited and developed throughout their time at school. Topics, such as Plants, are taught in Key Stage One and studied again in further detail throughout Key Stage Two. This model allows children to build upon their prior knowledge and increases their enthusiasm for the topics whilst embedding this procedural knowledge into the long-term memory.

All lessons follow the 'REAL' model for teaching and learning:

Reflect -what you already know?

Educate- the learning you are going to be doing today

Apply- application of what you have been taught

Learnt- what have you learnt today?

EYFS

Becoming a scientist begins in our early years unit where our children learn about science first hand; through carefully planned play-based activities both inside and utilising our outside learning area. We keep children naturally inquisitive and excited about the world around them. Science plays an important and progressive role within the school's curriculum therefore it is essential that children within EYFS are given every opportunity to discuss and explore their own ideas with increasing curiosity.

The Early Years Foundation Stage Curriculum supports children's understanding of science through the planning and teaching of 'Understanding the World'. Opportunities are provided for the children to consider similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary and make observations of animals and plants and explain why some things occur and talk about changes. Practitioners encourage investigative behaviour and raise questions such as, 'What do you think?',

'Tell me more about?', 'What will happen if...?', 'What else could we try?', 'What could it be used for?' and 'How might it work?'

Key Stage One

In line with the national curriculum 2014, the science curriculum at Edna G Olds Academy aims to ensure that all pupils:

- Provide the foundations for understanding the world through the specific disciplines of biology, chemistry and physics.
- Understand how 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.
- Recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena.
- Understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

In Key Stage 1 children observe, explore and ask questions about living things, materials and physical phenomena. Children begin to work together to collect evidence to help them answer questions and to link this to simple scientific ideas. They begin to evaluate evidence and consider whether tests or comparisons are fair. Children use reference materials to find out more about scientific ideas and communicating them using scientific language, drawings, charts and tables with the help of IT, if it is appropriate.

KEY STAGE 2

In Key Stage 2 children broaden their view of the scientific world around them. Through practical lessons children are encouraged to think about their own understanding of the world, to ask questions and to explore ways in which these questions can be answered through scientific investigations. Children are taught how to make predictions, plan investigations, keep tests fair, use equipment safely, measure and record their results, draw conclusions and present their results.

Science pedagogy

The teaching of science at Edna G Olds Academy enables the children to develop a mastery understanding of the key aspects of scientific learning, through the following core aspects:

- Knowledge – what the children need to know
- Working Scientifically – what the children need to be able to do
- Science Enquiry – how the children will learn or apply the knowledge and how they will learn or apply the working scientifically skills

"Practical work forms an important part of a science education."

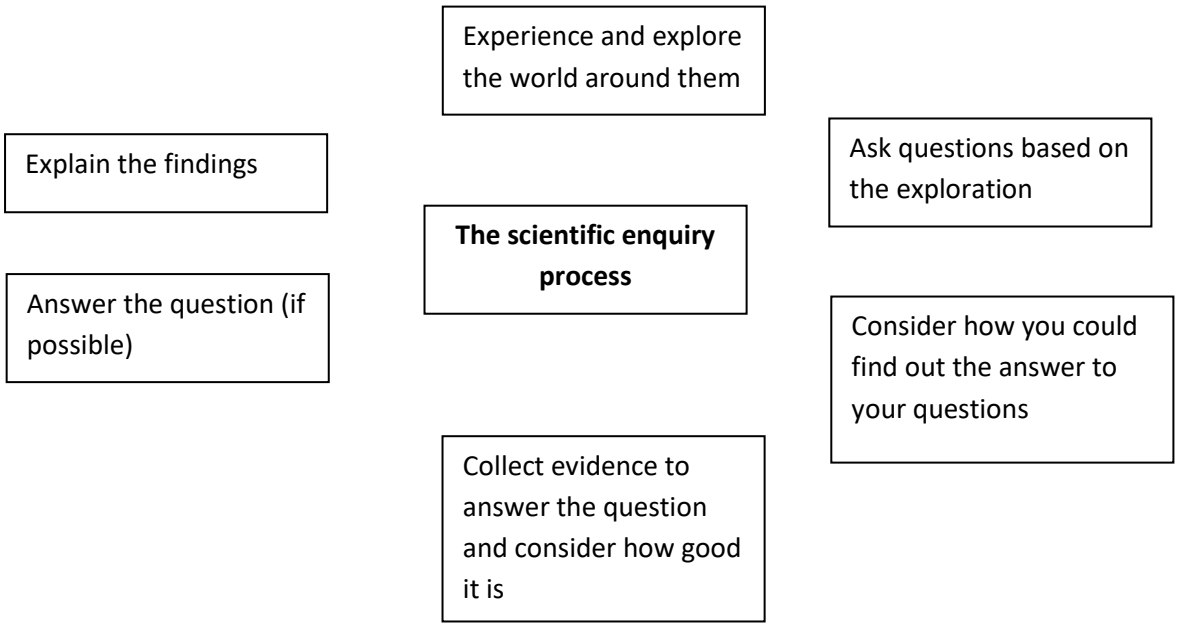
Research review of the factors that influence the quality of science education, Ofsted, April 2021

Scientific enquiry underpins the teaching of science at Edna G Olds. We believe that practical work is important for children for the following reasons:

- to be able to build their conceptual understanding (substantive knowledge)
- to develop the science skills needed to work as scientists and illustrate how scientific enquiry develops the body of scientific understanding (disciplinary knowledge).

Teachers are clear about the purpose of the practical work they do with children and consider what substantive or disciplinary knowledge the children will learn by doing it. Not all practical work will be scientific enquiry, and teachers and children are clear about when they are engaged in scientific enquiry and when they are not. The key point they consider when determining whether practical work is scientific enquiry or not is whether there is a question that will be answered by gathering data. If so, it is probably scientific enquiry. If not, it is just practical work.

The scientific enquiry process is as follows:



The main types of enquiry used to facilitate the learning of scientific knowledge at Edna G Olds Academy are observing over time; pattern seeking; identifying and classifying; research using secondary sources and comparative and fair testing. Across a unit of work the most appropriate enquiry type will be used and shared with the children, to deliver the science concepts and will allow for a range of scientific skills to be developed.

1. Observing over time

Some questions can be answered by observing how living things, materials and physical processes change over time.

Examples:

- How long will it take this cloth to dry?

- What happens when I put this carnation in coloured water?
- How does this carrot top change as it grows?
- How does the tree change over the year?

2. Pattern Seeking

Some questions can be answered by looking for links between variables where there is no casual relationship. This can involve looking for patterns when making observations/measurements or within data from secondary sources.

Examples:

- Do people with larger hands have larger feet?
- Do small seeds germinate more quickly?
- Do larger plants rotate more slowly?
- Do smaller mammals have a shorter gestation period?

Identifying and Classifying

Some questions can be answered by naming things and/or sorting them into groups. To do this, it may be necessary to carry out a simple test or use secondary sources.

Examples:

- What is this animal?
- What solids dissolve in water?
- Which materials are transparent, translucent and opaque?
- Which foods are high in fat?

Researching Using Secondary Sources

Some questions cannot be answered by pupils using first-hand experiences, for ethical or practical reasons, and therefore need to be answered using secondary sources.

- How far is the Earth from the Sun?
- At what temperature do different metals melt?
- What do the animals we found in the pond eat?

Comparative and Fair Testing

Some questions can be answered by looking for casual relationships between two variables i.e. when one variable is changed and its effect on something else is observed or measured.

Comparative testing

In a comparative test, the variable that is being changed is categoric i.e has labels such as the names of plants or types of material.

Examples:

- How stretchy are these fabrics?
- How long does a spinning top turn on different surfaces?
- How does the type of sugar affect how quickly it dissolves?

Fair testing

In a fair test, the variable that is being changed is quantifiable i.e. can be counted or measured.

Examples:

- How does the number of layers wrapped around a buzzer affect its volume?
- How does the volume of water affect how much salt can dissolve in it?
- How does the length of a plucked string affect the pitch of the note produced?
- How does the distance of the light source from the screen affect the size of the shadow produced?

Comparative and fair testing

Sometimes, as part of a comparative or fair test, the results may be gathered over a period of time.

Examples:

- How does the material a cup is made from affect how quickly the water cools?
- How does the amount of water affect how seedling grow?

Impact

The impact of the teaching of an engaging, high quality science curriculum at Edna G Olds Academy is that it will provide children with the foundations for understanding the world that they can take with them once they complete their primary education.

By the time children leave Edna G Olds they will:

- Not only acquire the appropriate age-related knowledge linked to the science curriculum, but also skills which equip them to progress from their starting points, and within their everyday lives.
- Be equipped with the scientific skills and knowledge that will enable then to be ready for the secondary curriculum and for life as an adult in the world outside the classroom.
- Have developed a rich scientific vocabulary which will enable to articulate their understanding of key scientific concepts.
- Have developed the skills of investigation – including observing, measuring, predicting, hypothesising, experimenting, communicating, interpreting, explaining and evaluating.
- Made links between science and other subjects.
- Understand that part of science is failing and that problem solving helps us to overcome these failures.

- Have a clear understanding of how scientists both past and present have contributed to society's understanding of the world around them.
- Understand the role that science and other STEM subjects play in solving some of the key problems facing the world, such as climate change.

Equal Opportunities and Adaptive Teaching

At Edna G Olds Academy, we believe that all of our children, regardless of race, gender, religion or ability have an equal right to access the national curriculum and should experience a wide and varied range of scientific experiences.

Throughout the teaching and learning process, we ensure inclusion of all pupils by:

- Representing all viewpoints and perspectives in the choice of materials.
- Modelling, explanation and explicit instruction by the teacher to groups, individuals and the whole class
- Carefully considering all pupils, including SEND and higher achievers, during the planning and delivery of science.
- Making use use of scaffolding techniques in terms of flexible grouping, resources, pre-teaching and the use of technology
- Using multi-sensory approaches
- Making use of cognitive and metacognitive strategies to promote long-term memory of concepts and skills.