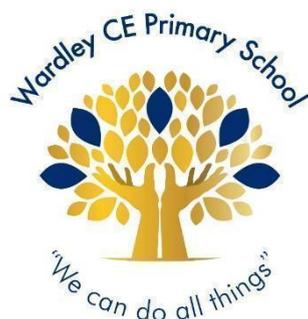


Wardley CE Primary School Science Policy



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| Name of Reviewer | Andrew Houston |
| Date of Approval of Governing Body | September 2023 |
| Signature of Chair | <i>Alan Johns</i> |
| Signature of Head | <i>Mark Foster</i> |
| Date Due for Review | September 2026 |

EQUALITY STATEMENT

As a school we welcome our duties under the Equality Act 2010. The general duties are to:

- eliminate discrimination, harassment and victimisation
- advance equality of opportunity
- foster good relations

We review all policies and procedures we operate to ensure there are no negative equality impacts based on the following protected characteristics: age, disability, ethnicity & race, gender (sex), gender identity & reassignment, pregnancy & maternity, sexual orientation, religion & belief and non-belief as outlined in the Equality Act 2010. If you feel, on reading this policy that there may be a negative equality impact, please tell us about this. Please also let us know if you need to access this policy in a different format. You can do this by contacting the school office.

Our school vision

We are a Church of England school that values and recognises the uniqueness of each individual child and acknowledges their fundamental right to be educated to their full potential in a safe, secure and caring environment. Our ethos is built on Christian foundations and drives our belief that we can do all things.

Wardley CE Primary School is committed to continual improvement to ensure that what we do today is even better tomorrow. We provide a happy, secure and supportive learning environment where the children develop independence and work hard to make the most of their talents, and that 'We can do all things' within a deep and rich curriculum.

We can do all things through Christ who strengthens us. Phillipians 4:13

Practical ways in which we attempt to carry out our school vision

Through the Christian value of respect:

- Having strong ethics to underpin our decision making and actions.
- Creating an environment which promotes the Christian ethos of trust, respect and honesty to enable people to flourish.
- Promoting a sense of justice.
- Creating a strong moral purpose which underpins everything we do

Through the Christian value of friendship:

- Having an inclusive ethos to create a school in which everyone is welcome and everyone is equal.
- In celebrating diversity we value the strengths of all and embrace differences.
- Engaging stakeholders within and beyond the school.

Through the Christian value of trust:

- Having a strong sense of teamwork amongst all members of the school community.
- No matter how small, we value every contribution and support each other to reach our goals.
- In respecting each other, we strive to not let each other down.
- In feeling valued and empowered people have a desire to go the extra mile.

Through the Christian value of courage

- Recognising, supporting and developing everyone's potential.
- Nurturing skills and promoting opportunities.
- Creating an environment for people to think positively and take risks.

Through the Christian value of perseverance:

- Through continual enhancement we are constantly striving to achieve high standards, we never stand still.
- All improvements are underpinned with high aspirations.
- When problems arise, we must hold on to our vision and find solutions.
- We inspire and innovate and we support others to do the same.

Spiritual Moral Social & Cultural Statement

At Wardley CE Primary School we aim to promote children's curiosity and understanding about the world in our science lessons. Science contributes to SMSC through encouraging reflection on the wonder of the natural world. By showing an awareness of the way science can affect society and the environment, we show respect for different opinions.

Spiritual Development in Science

Science is using evidence to make sense of the world. It has the ability to make us feel both enormously insignificant (compared to the scale of the visible universe) and enormously significant (we are genetically unique). It helps us understand our relationship with the world around us (how the physical world behaves, the interdependence of all living things). Making new discoveries increases our sense of awe and wonder at the complexities and elegance of the natural world. For scientists, this is a spiritual experience and drives us onwards in our search for knowledge and understanding.

Moral Development in Science

Whether it's the ethics behind certain medical treatments, the environmental impact of industry, or how government funding is allocated to scientific projects; moral decisions are an important aspect of science. Scientific discoveries and inventions need to be used responsibly, and decisions made based on evidence (not prejudice). As teachers, we encourage pupils to be both open minded (generating a hypothesis) and critical (demanding evidence) and to use their understanding of the world around them in a positive manner.

Social Development in Science

Scientists are collaborators. Sharing ideas, data, and results (for further testing and development by others) is a key principle of the scientific method. We encourage pupils to work together on scientific investigations and to share results (to improve reliability). Science supports social development by exposing children to the power of collaborative working in the science community which has led to some amazing and life changing breakthroughs in medicine and the environment. When undertaking experiments and research children work collaboratively. Science has a major impact on the quality of our lives. In Science lessons, pupils consider the social impact (both positive and negative) of science and technology upon our everyday lives

Cultural Development in Science

Science permeates modern culture and has played a key part in developing it. It is (both currently and historically) an international activity. In Science lessons, we explore and celebrate research and developments that take place in many different cultures, both past and present. We explore how scientific discoveries have shaped the beliefs, cultures and politics of the modern world.

Democracy:

Scientific collaboration is inherent upon the democratic process whereby evidence and conclusions undergo peer review by fellow scientists.

Specific examples of Spiritual, Moral Social and Cultural Development in science at Wardley include:

Learning about the scientific perspective on the start of the universe and the evolution of life (with consideration of religious beliefs)

Studying and discussing the impact on human beings on the environment, the problems created by industry and possible solutions.

Investigating the impact of significant scientists from around the world Debating and discussing ethical issues in science such as cloning, genetic modification and climate change

Studying the scientific method and how scientists collaborate to share and test ideas.

Intent

What is science?

“Science consists of observing the world by watching, listening, observing, and recording. Science is curiosity in thoughtful action about the world and how it behaves.”

NASA

“Science is the greatest collective endeavour. It contributes to ensuring a longer and healthier life, monitors our health, provides medicine to cure our diseases, alleviates aches and pains, helps us to provide water for our basic needs – including our food, provides energy and makes life more fun, including sports, music, entertainment and the latest communication technology. Last but not least, it nourishes our spirit.”

UNESCO

The 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 knowledge required to understand the uses and implications of science, today and for the future.

At Wardley, we encourage children to be inquisitive throughout their time at the school and beyond. Our Science curriculum fosters a healthy curiosity in children about our universe and promotes respect for the living and nonliving. We believe science encompasses the acquisition of knowledge, concepts, skills and positive attitudes. Science is a vibrant subject at Wardley about which we are incredibly passionate. Children have lots of questions about the world around us and we aim to provide them with the necessary core scientific knowledge and investigative skills to answer their questions about those processes.

At present, our curriculum provides a rich variety of topics that cover all the core scientific disciplines and contexts that the children can relate to their everyday lives. At the start of each topic the children are posed a key question or context from which they generate their own scientific lines of enquiry. They will then explore this question using a variety of investigative skills, engaging and becoming more familiar with each of the elements of the scientific method as they progress through the school. These include skills such as working collaboratively, making predictions, analysing results, observing changes over time, collecting results in a variety of ways, drawing conclusions from their observations and evaluating their own method and the reliability of their results. Underpinning this is an emphasis on children actively participating in their own practical investigations and experiments, utilising the classroom, wider school environment and the local environment.

Our subject intent is that to be a scientist at Wardley CE Primary means that you have:

- The ability to think independently and raise questions about working scientifically and the knowledge and skills that it brings.
- Confidence and competence in the full range of practical skills, taking the initiative in, for example, planning and carrying out scientific investigations.
- Excellent scientific knowledge and understanding which is demonstrated in written and verbal explanations, solving challenging problems and reporting scientific findings.
- High levels of originality, imagination or innovation in the application of skills.
- The ability to undertake practical work in a variety of contexts, including fieldwork.

- A passion for science and its application in past, present and future technologies.

Implementation

At Wardley CE Primary School our science curriculum involves:

Our whole school approach to teaching and learning of science involves the following

- A clear and well planned out topic cycle is followed to ensure children are getting a broad and balanced curriculum that is in line with the national curriculum,
- Children develop scientific knowledge and conceptual understanding through the specific disciplines of Biology, Chemistry and Physics.
- In Early Years, science is taught through the children learning about the world around them.
- Children are encouraged to ask their own questions and be given the opportunity to use their scientific skills and research to discover the answers.
- We build upon the learning and scientific skills of the previous year groups.
- Each science topic has a knowledge mat that highlights the key knowledge and vocabulary being taught that term.

Within each academic year, children will study six science units. Each Science unit is primarily based around one of the four core disciplines (Working Scientifically, Biology, Physics and Chemistry), with children touching on all four every year. Across the whole school, each core discipline has a set of key threshold concepts that the children will keep returning to in their science work. The children are assessed by the teacher during each unit against the age related expectations for these key threshold concepts. They are:

Working scientifically

- To work scientifically

Physics

- To understand movement, forces and magnets
- To understand the Earth's movement in space
- To investigate light and seeing
- To investigate sound and hearing
- To understand electrical circuits

Chemistry

- To investigate materials

Biology

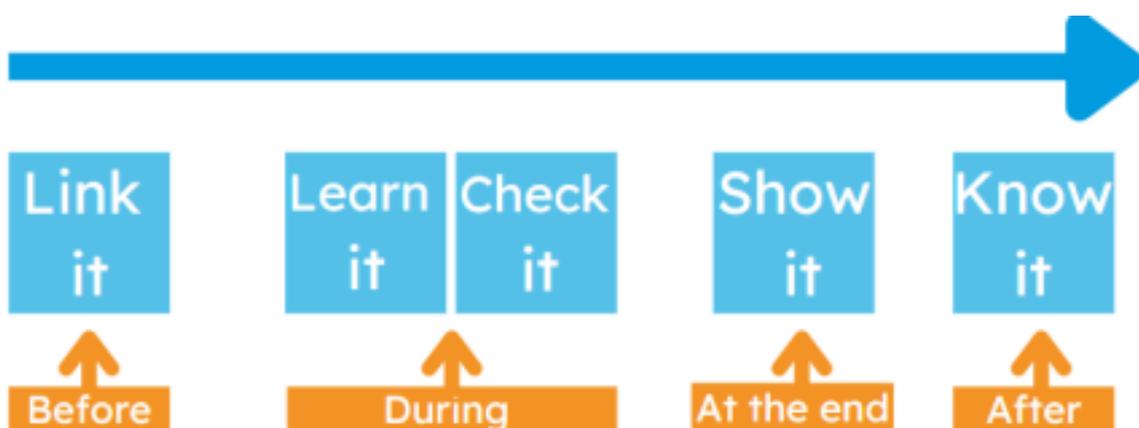
- To understand plants
- To understand animals and humans

- To investigate living things
- To understand evolution and inheritance

Substantive Knowledge

The substantive knowledge is the scientific knowledge and vocabulary that is developed within our science curriculum. This knowledge is covered through the curriculum strands of physics, biology and chemistry. As such, this substantive knowledge has been embedded within the threshold concepts for physics, biology and chemistry. We believe that it is through the use of these disciplinary skills that the pupils become more expert in their substantive knowledge. This substantive knowledge is further detailed in our science knowledge organisers.

At Wardley CE Primary School we place five pedagogical principles at the heart of our science curriculum and we have ensured that there is time spent on the intent of how we deliver this. Our aim is for the children to ‘remember more and know more’.



Link It: At the beginning of a unit of learning teachers carefully link the children’s prior learning. Learning starts with igniting pupils’ prior knowledge. Research on cognitive load recognises the potential benefits this will have upon long-term retention. Once established, we move onto the ‘Learn It’ stage where the composite learning is broken down into manageable components.

Learn It: This is new learning. It is often taught through a sequence of lessons that follow a ‘line of enquiry’. These are shaped by key questions which guide the children’s exposure to new knowledge and link it back to the overarching line of enquiry. Children learn the substantive knowledge required for the area of learning (based on the essential opportunities) whilst developing their disciplinary knowledge for the subject through the threshold concepts.

Check It: Throughout the ‘Learn It’ phase, teacher’s plan ‘Check It’ opportunities for adults to review their learning to date. This gives teachers the opportunity to recognise gaps in pupils’ knowledge and to enable them to make future decisions

based on these assessments. Throughout lessons, the children's understanding will be checked by the teacher through a range of 'Check It' tasks.

Show it: At the end of a sequence of learning, we use 'show it' which is beneficial in enabling pupils to showcase their learning. The children present their learning at the end of each area of learning. This often takes the form of an end of unit reflection activity in which the children bring together their ideas in response to the 'line of enquiry' that they have been following. Importantly, there is encouragement for pupils to come up with innovative ideas.

Know It: At Wardley CE Primary School, we check that the children know more and remember more with a summative activity at the end of each area of learning. As well as this, the children have regular retrieval sessions to retrieve their prior learning to ensure that it is not lost. This would normally be after the area of learning has been concluded and could be later, or even much later, in the school year.

.Links to the Wider Curriculum

At Wardley CE Primary School science is taught through a blocked curriculum approach and we teach science discreetly. We try to link science to other subjects to help build on prior knowledge whilst ensuring no tenuous link is made.

Science capital at Wardley is secure and based around real-life experiences and supports curriculum learning retention. We utilise the school environment and local community to promote aspirational views of science in the world of work. Science at Wardley encourages our children to have the confidence to apply their scientific knowledge to other subjects and to know that science plays an important role in the world we live in. We believe children learn best through an interdisciplinary approach that explores the connections among different branches of science and other fields.

Wherever possible, the Wardley Science Curriculum is enhanced by interweaving content through other subjects. Linking Science with the other STEM subjects (Science, Technology, Engineering and Maths) allows pupils to become the critical and creative thinkers that they need to be to thrive in future society. Children apply their mathematical knowledge to their understanding of science, including collecting, presenting and analysing data.

At Wardley CE Primary School we use computing in science teaching where appropriate. Children use computing in science to enhance their skills in data handling and in presenting written work, and when researching information using the Internet. Children engage regularly in collaboration with their peers and the use of the internet in answering a 'key question'.

The Wardley curriculum for science reflects the importance of spoken and written language in pupils' development across the whole curriculum – cognitively, socially and linguistically. The quality and variety of language that pupils hear and speak are

key factors in developing their scientific vocabulary and articulating scientific concepts clearly and precisely. We believe that science promotes communication in a specific and precise language involving mathematical and logical thinking. It allows children to develop ways of finding out for themselves and gives them practice in problem solving. By having students write down each procedural step within an investigation, analysis and evaluate the outcome, our pupils are learning to communicate clearly in written form.

Linking with work in geography and RE in particular, our science curriculum seeks to nurture the awe and wonder found in the natural world, a sense of personal responsibility and an understanding of connections at personal, local and global level.

The history of science is a standard part of our science curriculum and as such, we can discuss the inventions, discoveries and scientists that influenced world events.

Science and history go hand-in-hand as history marks the time when scientific advances and discoveries were made e.g. Sir Isaac Newton and his recognition of the impact of gravity on our everyday life and how the solar system works.

Relating science to physical education brings science to the personal level of the learner. Thus, physical education can serve as a vehicle for teaching science and make student understanding of certain personal health-related science concepts meaningful. The practical use of experimentation vocabulary when learning about heart rate or burning calories is a great way to reinforce these important science concepts in physical education class. There are also many opportunities to highlight science related vocabulary that is used during PE classes (i.e. – speed, friction, angle of trajectory, fulcrum, lever, aerodynamics, etc.). There are other awesome activities that use student knowledge of science concepts (i.e. – Habitat Survivor (dodging and fleeing), Evaporation (tossing flying discs at a target), Rocket Launcher (striking and catching pool noodles), etc.).

Science in the EYFS

At Wardley, we recognise the importance of Science in every aspect of daily life. We give the teaching and learning of Science the prominence it requires. The Scientific area of learning is concerned with increasing pupils' knowledge and understanding of our world, and with developing skills associated with Science as a process of inquiry.

Science at Foundation Stage is covered in the '**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.

During their first years at school, our children will explore creatures, people, plants and objects in their natural environments. They will observe and manipulate objects and materials to identify differences and similarities. They will also learn to use their senses, 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. Children are encouraged to ask questions about why things happen and how things work. They will carry out activities such as increasing the incline of a slope to observe how fast a vehicle travels, or opening a mechanical toy to see how it works. Children will also be asked questions about what they think will happen to help them communicate, plan, investigate, record and evaluate findings.

In nursery and reception children will, within their Understanding the World work towards the following outcomes: Children will be able to make sense of their physical world

- Build important knowledge and sense of the world around them from stories, investigations and visits
- Begin to talk about why things happen and make simple predictions

By the end of Reception children should:

The Natural World

- Explore the natural world around them, making observations and drawing pictures of animals and plants
- Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class.
- Understand the effect of the changing seasons on the natural world around them.

Impact

The impact of the subject can be seen in the progress that the pupils make. This can be seen as knowing more, remembering more and being able to do more. It is about the pupils developing their ability to think geographically. It is about connecting existing and new knowledge, developing competence and making links. Assessment is both formative as children learn and summative to evaluate the gains that have been made. It is kept to the minimum necessary to be fit for its purpose.

At Wardley CE Primary School assessment is in line with the school's assessment policy. Teachers are expected to assess at the end of each topic against the subject's threshold concepts (disciplinary knowledge) and the subject's substantive knowledge, which enables teachers to track each child's progress. These are based on the subject's National Curriculum programme of study,

The way we assess this progress includes the following practice (as set out in the school's teaching & learning policy and assessment policy):

- On-going formative assessment- this includes the use of day to day assessment for learning classroom practice and feedback. It looks at the pupil's development of key

knowledge and skills. It can include short tests and quizzes. The aim is to reactivate thinking, make links and connect ideas to better embed them in the long term memory.

- Long term summative assessment - this looks at the subject's substantive and disciplinary knowledge. It involves the pupils drawing their learning together, for example in the end of unit responses to the key questions. It also provides an overview of whole school progress for the subject leader.

Role of the subject leader.

The science subject leader at Wardley CE Primary School is Andrew Houston.

Their role as a subject leader is to act as a guardian of the standards in the subject.

This means that they know:

- How well pupils achieve.
- What the strengths of provision are
- What needs to be done to improve outcomes.

To achieve this subject leaders undertake the following monitoring activities on a termly basis:

- Lesson observations.
- Monitoring of children's books.
- Discussions with both adults and children.
- Looking at classroom displays.

In addition subject leaders will:

- Support staff in their development of planning and to monitor planning.
- Facilitate the sharing of good practice among staff.
- Work together with colleagues to raise standards.
- Ensure that the policy documents and curriculum resources remain useful and current.

Science and links to home.

Ideas about how parents and carers can help their child with science at home are sent out on the class curriculum leaflets each half-term. Science is often the focus of the half-term homework project. This allows the children to use their imagination to

present their projects in a variety of ways such as in written, oral or pictorial form as well as using ICT. As a school, we celebrate British Science Week in a variety of ways. Families are encouraged to participate in the annual British Science Week poster competition.

Inclusion

At Wardley CE Primary School all children have access to science lessons and activities regardless of their characteristics or ability. Teaching approaches provide equality of opportunity by making sure the work is suitable for all, regardless of gender, considering religious and cultural beliefs and enabling those with disabilities to have full participation

Through adaptive teaching we provide all children with the tools and support to be involved and access every science lesson. This is the 'low threshold, high ceiling' model of teaching and learning that is set out in our teaching and learning policy.

To promote an inclusive environment in science we will use the following provision model:

Wave 1 Support

Inclusive Quality First Teaching

Differentiated planning and work
Additional concrete resources to support learning in class e.g. number lines, word mat, visualiser
Inclusive ethos and learning environment – SEN Policy, Accessibility Policy, SEN Information Report.
Behaviour management
Effective deployment of staff and support staff
Consideration of teaching programs and planning for varied learning styles
Accurate assessments
Pupil progress meetings
Working closely with parents
Being mindful of cultural and social differences / influences in the community

Wave 2 Support

Additional Interventions to enable children to work at age-related expectations or above

Provision mapping
Interventions – both evidence based and informal e.g. Phonics, Mr Goodguess, SALT, Lego therapy
Use of marking and assessment to identify children who need a re-cap focus
Pre-teaching / Post teaching follow up
Small group phonics
Well-being groups
Social communication resources in class e.g. timetables, social stories
visual cards
SALT strategies used in class e.g. visuals to support, use of gestures/sign language

Wave 3 Support

Targeted provision for those who require a high level of personalised and specialised support

IEPs
SALT intervention or 1:1 specialist SALT
1:1 emotional therapy – iThrive
1:1 input LSS and PIT
Enhanced SALT support (School Buy-in)
Precision teaching
Behaviour plans
Personalised reward programs
Personalised strategies used in class – e.g. dyslexia overlays, specific formats for writing on