



Science Policy

1. Introduction and Curriculum design	2
2. Aims	2
3. Attitudes	3
4. Skills	3
5. Teaching aims	3-4
6. How science is structured throughout school	5
7. Equal opportunities	6
8. Assessment and recording	7
9. Monitoring	8
10. Health and Safety	9
11. Appendix 1- Curriculum overview	10
12. Appendix 2- Websites	10

St George's VA Science Policy

Introduction

This policy reflects the values and philosophy of St George's VA in relation to the teaching and learning in science. It will bring a structured approach to the subject, thus achieving balance, progression, breadth and continuity throughout the school and meeting the needs of the individual.

Why do we believe it is important to teach science?

Scientists at all levels, from children in the classroom to university researchers, use skills of investigation to find out more about the world around them. For the child, the importance of teaching science is because:

1. Scientific knowledge can give a deeper understanding of the world. All children are naturally curious about their environment and Science makes a valuable contribution to their knowledge and understanding of the world.
2. Scientific attitudes can foster their curiosity and develop enquiring minds.
3. Scientific skills can equip children with strategies for finding out independently and solving problems.
4. Science has, does and will continue to play a major role in our modern society.

At St George's, we have designed our Curriculum using the Cognitive load theory where we work on a 3 week cycle with either a History/Geography, ICT or Art and DT focus. Science is taught weekly. Each lesson begins with a revisit, whether it be a recap of the week before or earlier to consolidate children's knowledge and understanding. Each topic has been carefully planned out to show progression of the Chris Quigley milestones but also vocabulary and children's knowledge. In each term, there is a revisit of previous learning so children are regularly taught scientific knowledge but in a range of contexts. Many revisits and interruption slides will be taught across the curriculum to consolidate knowledge and skills.

Tell me and I will forget,
Show me and I may remember,
Involve me and I will understand.

Aristotle

Aims

We believe that a broad and balanced science education is the entitlement of all children, regardless of ethnic origin, gender, class, aptitude or disability. Our aims in teaching science include the following.

- Preparing our children for life in an increasingly scientific and technological world.
- Develop curiosity and foster problem solving, exploration and discovery.
- Encourage development of problem solving strategies in science, and transfer of these skills to other areas of the curriculum.
- Fostering concern about, and active care for, our environment.

- Developing our children's understanding of the international and collaborative nature of science.

- Enhance the children's understanding of the world by extending our children's understanding of scientific concepts.
- Teach the Science National Curriculum programmes of study.
- Plan for continuity and progression.

Attitudes

- Promote positive attitudes towards science and scientists.
- Building on our children's natural curiosity and developing a scientific approach to problems.
- Encouraging open-mindedness, self-assessment, perseverance and responsibility.
- Building our children's self-confidence to enable them to work independently.
- Developing our children's social skills to work cooperatively with others.
- Providing our children with an enjoyable experience of science, so that they will develop a deep and lasting interest and may be motivated to study science further.

Skills

- Giving our children an understanding of scientific processes.
- Helping our children to acquire practical scientific skills.
- Developing the skills of investigation - including observing, measuring, predicting, hypothesising, experimenting, communicating, interpreting, explaining and evaluating.
- Developing the use of scientific language, recording and techniques.
- Developing the use of ICT in investigating and recording.
- Enabling our children to become effective communicators of scientific ideas, facts and data.
- Encourage co-operative skills as well as the growth of the individual

Our teaching aims

Science is a core subject in the National Curricula (*for England*,). And states that the aim of the curricula is to ensure all pupils should:

- 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.

We aim to fulfil these aims by ensuring we are:

- Teaching science (*National Curriculum*) in ways that are imaginative, purposeful, well managed and enjoyable.
- Giving clear and accurate teacher explanations and offering skilful questioning.

- Making links between science and other subjects.

Children in the foundation stage - the reception classes - are taught the science elements of the foundation stage document through the Early-Learning Curriculum: Knowledge and Understanding of the World.

At Key stage 1

The principal focus of science teaching in key stage 1 is to enable pupils to experience and observe phenomena, looking more closely at the natural and humanly-constructed world around them. They will be encouraged to be curious and ask questions about what they notice. They will 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. They will 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. Most of the learning about science will be done through the use of first-hand practical experiences, but there will also be some use of appropriate secondary sources, such as books, photographs and videos.

'Working scientifically' will be taught through and clearly related to the teaching of substantive science content in the programme of study.

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

At Key Stage 2

The principal focus of science teaching in lower key stage 2 (Years 3 & 4) is to enable pupils to broaden their scientific view of the world around them. They will do this through exploring, talking about, testing and developing 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. They should 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. They should draw simple conclusions and use some scientific language, first, to talk about and, later, to write about what they have found out.

'Working scientifically' will be taught through and clearly related to substantive science content in the programme of study.

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

The principal focus of science teaching in upper key stage 2 (Years 5 & 6) is to enable pupils to develop a deeper understanding of a wide range of scientific ideas. They will do this through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically. They will encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. They should also begin to recognise that scientific ideas change and develop over time. They should 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. Pupils should 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.

'Working and thinking scientifically' will be taught through and clearly related to substantive science content in the programme of study.

Pupils should read, spell and pronounce scientific vocabulary correctly.

Structure and Approach to Science throughout St George's

Planning for science has been adapted using the Chris Quigley Milestones ensuring teaching is revised using Cognitive Load Theory. Science teaching in the school is about excellence and enjoyment. We adapt and extend the curriculum to match the unique circumstances of our school. Science planning has been provided to the teachers as a result of the curriculum changes. Using 'basic' 'advancing' and 'deep', teachers plan carefully thought-out lessons to meet the needs of the children, providing them with the knowledge and understanding they need to be great scientists.

The lessons are on a cycle whereby one week teachers will teach one area, e.g, plants and the following week teachers will teach a completely different area within Science, e.g, Materials. Years 1, 3 and 5 will be primarily focusing on the 'basic' task in the first year, whereas years, 2, 4 and 6 will not only be recapping the 'basic' tasks but also using the 'advancing' tasks to challenge the pupils. The 'deep' tasks are a further challenge that will be mostly used after the 'basic' and 'deep' tasks have been implemented.

The milestones and children's understanding will be frequently recapped using the 'revisit' system whereby at the beginning of each lesson, children complete a short (5 minute) revisit activity on previous learning. This is to fully embed the scientific understanding and ensure children are improving their knowledge but also increasing the ability to remember vocabulary and what the 'Science learning' is within the lesson. Each term, children will be taught different lessons to embed this understanding within a topic. So although they are only taught an area of Science one per term, this is revisited regularly in future lessons but also taught in a different context later on in future terms.

Science is linked to practical experiences whenever appropriate, however, the emphasis is currently on the Scientific knowledge and understanding as opposed to the practical element. Although the practical element is important along with the Scientific enquiry, a primary focus is on the knowledge that underpins the science that is being taught. Some science learning can be well supplemented through the use of an experiment, but children must be taught the basic principles or the 'science' before they can transfer their knowledge. This is why teachers carefully plan their lessons to ensure they achieve the best outcomes for their children, ensuring children are taught the scientific understanding but also the skills within Scientific enquiry.

Throughout all lessons, teachers question the children to enhance their knowledge in a particular area, but also, children are encouraged to ask questions about what they see to enhance their curiosity. Questioning is a huge part of our Science lessons, allowing the children to explore, reason and wonder why something is happening the way it is. Continuous provision is out during each lesson to increase children's curiosity but also learn a range of scientific knowledge independently and in a range of contexts. There are also activities out to ensure children can apply their knowledge learnt.

Ofsted outline the importance of children's vocabulary within Science. Children are taught a range of vocabulary within a Science lesson and this is evidenced on displays around the classroom. Children also receive a 'knowledge organiser' whereby they have all the key vocabulary to support them in a lesson with definitions and pictures. Children's vocabulary is also enhanced through vocabulary games that can be used within the 'revisit' part of a lesson where children can share what they know about the area of science they are learning through an enjoyable, yet beneficial way.

All KS1 and KS2 classes have between 1-2 hours of Science per week. There is no expectation to hand planning in as this has been completed to ensure progression by Subject leads, however, resources and lesson notes may be checked at any point throughout the year.

We use ICT widely in science wherever possible. Children are given the opportunity to practice science skills and enhance their presentation using carefully-chosen software.

We use ICT for enquiry work, including microscopes with digital cameras, video capture of images and activities, and data logging. We use the school's shared server to share science resources.

Cross curricular links are made where possible – for example in literacy work on explanation or in links to history and geography topics. This is even more apparent within the creative curriculum. Groups are encouraged to communicate their findings in a variety of ways such as diagrams, posters, concept cartoons, mind maps, talking partners and group scribing.

Equal opportunities in science

Science is taught within the guidelines of the school's equal-opportunities policy.

- We ensure that all our children have the opportunity to gain science knowledge and understanding regardless of gender, race, and class, physical or intellectual ability.
- Our expectations do not limit pupil achievement and assessment does not involve cultural, social, and linguistic or gender bias.
- We aim to teach science in a broad global and historical context, using the widest possible perspective and including the contributions of people of many different backgrounds.
- We draw examples from other cultures, recognising that simple technology may be superior to complex solutions.
- We value science as a vehicle for the development of language skills, and we encourage our children to talk constructively about their science experiences.
- In our teaching, science is closely linked with literacy, mathematics and ICT.
- We recognise the particular importance of first-hand experience for motivating children with learning difficulties.
- We recognise that science may strongly engage our gifted and talented children and we aim to challenge and extend them.
- We exploit science's special contribution to children's developing creativity; we develop this by asking and encouraging challenging questions and encouraging original thinking.
- Groups are often mixed in ability to promote peer teaching;
- We specifically target and support children with learning barriers or who are having difficulty in understanding particular concepts or vocabulary;
- Teachers and TAs work with specific children to promote understanding;
- We have good quality resources, centrally stored, and provide enough so that children have access to hands on experiences.

Assessment and recording in science

We use assessment to inform and develop our teaching.

- Topics commonly begin with an assessment of what children already know. Concept cartoons are a great tool for assessing prior knowledge. This may also be shown as a 'big question'.
- We assess for learning (AfL). Children are involved in the process of self-improvement, recognising their achievements and acknowledging where they could improve.
- Target sheets are kept at the front of all pupils books and completed with the child every term. Children complete these as well as the teacher to promote 'self-assessment'.
- We mark each piece of work positively, mostly using our 'no marking, marking' system providing children with constructive feedback for challenge or support. This could be through questioning. Children's work is compared with age-related expectations. The subject leader and phase teams moderate work together to ensure that our assessment is consistent. Assessment records are reviewed termly.
- We have a tracking system to follow and accelerate children's progress. The school science coordinator monitors progress through the school by sampling children's work at regular intervals. Children who are not succeeding, and children who demonstrate high ability in science, are identified and supported.
- We use a range of assessment techniques to find out what children understand and what we need to do to promote further development. Assessment is usually done while a task is being carried out through discussion, specifically questioning between child and teacher;
- Assessment 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.
- After each unit of work all year groups will record their test data and store this on the tracker – Insight. This will then be combined with the 'working scientifically' teacher assessments to gain an overall assessment compared with age-related expectations which will then be recorded on the school tracking system.
- The Y2 and Year 6 teachers make regular assessments throughout the year and these teacher assessments are reported to the authority at the end of the year. This teacher assessment is based on assessment records and ability to demonstrate their knowledge through assessment tasks. Reports to parents are written once a year, describing each child's attitude to science, his/her progress in scientific enquiry and understanding of the content of science.
- TAPs Assessment will be used throughout the school where children complete a small task to show their understanding. Teacher assess through expectations of what the children should be saying and mark the children according to their explanation/discussions/record of work in book.

Monitoring

Monitoring of the standards of children's work and of the quality of teaching in science is the responsibility of the science coordinator to ensure continuity and progression throughout the school. The role of science coordinator also involves being informed about current developments in the subject, and providing a strategic lead and direction for the subject in school. An annual summary of science is made in which strengths and weaknesses in the subject are evaluated, and an action plan to address any issues arising is formulated for the forthcoming year.

Book scrutinies occur once every term to ensure quality of work and making sure that work is at ARE. Learning walks will take place primarily in the summer term to ensure teaching is at least good. Smart boards and resources will be looked at during each term to ensure children are being taught relevant and well thought-out lessons. Science Lead will interview teachers and pupils so they can share their opinion on the teaching and learning of science in their class. Staff meetings will take place to feedback and implemented changes and CPD.

The Co-ordinator is responsible for:

- Writing a science policy and any other documentation, in consultation with the whole staff.
- Ensure consistent implementation of the Policy; continuity and progression.
- Provide support and guidance to other members of staff by means of meetings and discussion. CPD for the staff – using Reach-out Science Scheme.
- Monitor the science curriculum and standards of teaching and learning, including methods of assessment.
- To organise, order and be responsible for resources
- Keep self and colleagues up-to-date with recent developments in science. Masterclasses occur at least once a term to promote good teaching and learning and ensure staff are up-to-date. This is also a time to share successes and discuss anything that may not be working as well as hoped.

It is the responsibility of the Headteacher to:

- Ensure consistent implementation of this policy.
- Monitor the curriculum, planning, teaching and learning in science to ensure progression and continuity.
- Arrange INSET and staff meeting availability.
- Ensure the school is meeting statutory requirements with regards to science.

Responsibility of the class teacher to:

- Ensure day to day implementation of this Policy
- Ensure that science resources are maintained and used safely
- Ensure that the requirements of the National Curriculum for Science are met for their class.
- Assess individual pupil's achievements and attainments
- Keep selves up-to-date with developments in science using Reach out Science – CPD.

Responsibility of Non-Teaching staff

- Support implementation of this policy
- Maintain resources
- Assess individual children's achievement and attainment
- Feedback to the class teacher
- Keep selves up-to-date with developments in science

Responsibility of the Governing Body to:

- Monitor and evaluate the effectiveness of science progression and learning within school.
- Keep selves up-to-date with developments in science

Health and Safety Issues in Science Education.

Due to the practical hands in aspect of Science, from time to time there will be opportunities for pupils to handle apparatus and substances which if not supervised and controlled correctly could prove to be hazardous.

Guidelines to ensure safe practice at all times:

- Good organisation of equipment and apparatus is essential for safe working and enable children to accept some responsibility for their own learning.
- Avoid using glassware. Where it is to be used, i.e. test tubes, a suitable holder or stand should be used.
- A suitable fire extinguisher must be available before undertaking any activity using a naked flame.
- Teachers should take care to control the use, and ensure the security, of fuels and matches as well as being alert to hazards directly associated with heating.
- No mains electrical equipment should be used near water
- The area around a naked flame should be cleared of anything flammable
- Dry batteries are safest to use. It is not possible to get an electric shock unless a great many of them are joined together
- Old batteries should be discarded safely
- Pupils must be supervised with particular care when heating things
- Sniff tests should be done through muslin

Further guidance can be found in Be Safe! 4th edition.

For guidance on First Aid please consult the school's Health and Safety Policy

Review

This science policy will be reviewed by the science curriculum leader and the senior management team.

Date for next review of this document

(Policy written by R. Hume – Science Co-ordinator 2017)

Appendix 1

Curriculum Overview

	Autumn	Spring	Summer
EYFS	Us growing	space	Growing (garden) minibeasts
Year1	Food Common Materials	Materials Common Animals	Materials Sun/ shadows
Year 2	Everyday materials	Animals/ humans	Minibeasts/ habitats
Year 3	Plants and life cycles Animals and skeletons	Fossilisation Rocks and soils	Light and shadows Forces and magnets
Year 4	Changes of state Water cycle	Classifying Food chains Digestive systems	Sound Electricity
Year 5	Space Life cycles of plants	Human development	Classifying materials Reversible/irreversible changes Mixtures and solutions
Year 6	Evolution and adaptation Electricity	Classifying and microorganisms Forces	Light Health and lifestyles

Appendix 2

Science Websites

www.tigttagworld.co.uk

The 'Switched on Science' website with interactive resources, quizzes, video clips and lesson ideas

www.ase.org.uk

The ASE promotes excellence in science teaching and learning

www.primaryupd8.org.uk

Lots of activities for 5-11 year olds, go to topic finder at top of page

www.sciencemuseum.org.uk

The museum website has resources, details of educational bookings and outreach events. Resources link is:

http://www.sciencemuseum.org.uk/educators/classroom_and_homework_resources.aspx

www.planet-science.com

Free resources for children, teachers and parents

www.ecsite-uk.net

The national network of science centres and museums, some of which provide free online resources

www.stemnet.org.uk

UK charity that promotes science, technology, engineering and maths awareness
www.stemdirectories.org.uk