

# Science Policy

Reviewed September 2021



**The Stour Academy Trust**

## Introduction

This policy outlines the aims, organisation and management of teaching and learning of Science within The Stour Academy Trust. This policy explains why and how we design, plan, teach and assess Science. It is based on the National Curriculum 2014 Programmes of Study and review of research, literature, classroom practice, global events, school contexts and feedback from staff, parents, members of the community and the children. Our science curriculum is being transformed into a 21<sup>st</sup> Century teaching and learning practice using a digital exercise book for pupils.

All pupils should be taught essential aspects of the knowledge, methods and uses of science. Through building up a body of key foundational scientific knowledge, concepts and scientific skills, they should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. Pupils should be encouraged to understand how key foundational knowledge and concepts can be used for explanation of what is occurring, prediction of how things will behave, and analysis of causes. This foundational understanding should be consolidated through appreciation of specific applications in the world around us.

## Intent

Our Science curriculum has been carefully researched and designed for progression and depth of learning, learning across contexts, which are working scientifically through enquiry based questioning. This has been meticulously planned for within each science topic by reading the *Long Term Plan*. There are 11 key components, which underpin our Science Curriculum as a whole:

1. **Learning and Remembering** - We have designed the Science curriculum with a model of Learning and Remembering in mind. This means, scientific knowledge of concepts and working scientifically are meaningfully repeated with the aim to secure these in longer-term memory and developed further each time they are revisited and built upon.
2. **Progression** – The progression of the concepts and processes within each topic have been mapped out and integrated into the Long Term Plan from EYFS all the way through to Y6.
3. **Challenge and Mastery** – Lessons planned to be challenging, increasing in the level of challenge over time, applied within a range of contexts to reach a level of mastery through exploration and research.
4. **Scientific Vocabulary, Language and Concepts** – We teach a scientific concept but build on scientific knowledge in a different context, frequently, so children have the best chance to link and fully learn new vocabulary and related knowledge.
5. **Cross-Curricular Topics**– Maths, ICT and other creative curriculum subjects help bring knowledge and skills to a topic and to do so in depth: a topic viewed through the multiple lenses from which the selected subject disciplines can provide.
6. **Sequence of Topics for Progression and Depth** – Each topic has been carefully sequenced so that scientific knowledge is revisited, built on, linked and progress in complexity. Each topic builds from the previous learning, helping children to secure a



strong body of knowledge by the end of each year, which is then built upon the following year. A topic has earned its place, as the learning involved is essential for making deeper sense of the next using small scientific steps. This ensures learning is always revisited, linking, building, deepening and never lost.

7. **Blooms Taxonomy of Thinking-** Our Science curriculum does not only demand all children to *remember* and *understand* knowledge but how to think and use this knowledge in various ways through our Big Questions. We have designed scientific topics so children have to *apply* knowledge skilfully, *analyse* it, *evaluate* it and think scientifically with it in order to develop understanding through our Big Questions and small scientific steps.
8. **Key scientific concepts and scientific skills.-** We teach children the process of being a scientific thinker. This means, children are faced with a problem (Big Question) to develop their thinking and the science knowledge is broken down into small steps. The 5 key scientific stages of Aim (Exploration), Methods (Development), Diagram (Presentation), Results (Performance) and Conclusions (Evaluation). Throughout these 5 stages, we plan sufficient time to be curious, show enjoyment and interest, ask and answer questions, explore, build on previous knowledge, make links across contexts, reason, develop, refine, rehearse, embed and demonstrate learning, building to a final response to develop positive attitudes to science which encourage collaborative learning and perseverance. As part of this process, we plan experiences, which inspire our children to respond meaningfully, taking ownership of how to do this.
9. **SMSC, BLP, BV** – Not just teaching subject content, but key values to prepare children for life, along with characteristics of effective learning. This is planned into the scientific texts and the challenging tasks, questions and issues embedded within each topic, becoming more sophisticated over time.
10. **Rich and Varied Experiences** – Our children do not always come to school with the wealth of experiences required to fully understand our world. It is through our curriculum where we ensure every child does have these experiences as part of a well-planned sequence of lessons.
11. **Adaptable** - Adapted to the needs of all the children, the local community and to our ever-changing wider world. Our curriculum will develop pupils' awareness of how science influences and affects our everyday lives and therefore the relevance of their learning. This means we actively seek to review our curriculum in order to meet the needs of our children and their world today and of the world tomorrow. There will be opportunities to allow children's understanding of jobs that use scientific skills, using well-known scientists across the world, visitors and inspirational ambassadors.

In short, it is a curriculum sequenced for remembering and mastery, designed to inspire genuine learners and develop learning in depth, enabling all children to make meaningful links across scientific contexts to better understand and engage with the self, the content, the world and life. It challenges all children to reach a level of well-informed, critical and scientific thinking. A curriculum, which ultimately, gets children desperate to learn and prepared for the future that awaits them.



## **The Science Curriculum**

### **EYFS Stage**

- Science is taught in the Nursery & Reception classes according to the Curriculum guidance for the Foundation Stage. It is incorporated in the Early Learning Goal 'Knowledge and Understanding of the World' in which pupils develop the crucial knowledge; skills and understanding that helps them make sense of their world.
- In our Science Long Term Plan are Big Questions to help support curiosity and questioning in Early Years Science (See Science LTP).

### **Key Stages 1 and 2**

- The knowledge and skills within The National Curriculum Programme of Study (2014) are met using our Science Long Term Plan including a Big Question and rationale and appropriate cross-curricular opportunities using our creative curriculum.
- Each year group will cover units of work as shown in our Science Long Term Plan including a Big Question and rationale.
- Lesson plans will identify the intended learning of both scientific skills and knowledge. They will also take into account: how to engage the children in the lesson including deeper thinking and challenge for all children through Big Questions, resources required, how children will be organised, how the children will record, differentiation, use of ICT to support learning, key scientific vocabulary, Scientists of the term using Chatterpix and use of other adults.
- Links to other areas of the curriculum that enhance their understanding of science are identified and incorporated into planning.

### **Implementation**

Science is taught with an emphasis on the pupils engaging in scientific enquiry using our small steps and big questions to develop their understanding of scientific concepts and skills. Teachers ensure that some of the children's ideas are used as a basis for enquiry and challenged through deeper thinking.

We ensure the intention of the curriculum, as stated above, is implemented at the Medium Term Planning stage and through to the teaching and learning within classrooms. This section outlines how this is achieved.

### **Researching and Planning**

- A member of the Senior Leadership Team facilitates a planning meeting, which begins with using the LTP.
- Teachers within year groups across the Trust meet to plan a topic to identify key learning from the LTP, as well as the learning we are building upon and building towards. Through the planning process, teachers are enabled to notice where links within subjects and across contexts can be made. Teachers share and develop the possibilities for teaching and learning.



- Teachers prepare medium term plan using the National Curriculum, the Long-Term Plan, programmes of study, websites, literature, research, each other, assessments and the children.

### **Medium Term Planning**

- Teachers adapt any plans to meet the needs of their children, the curriculum and the context of their school.
- Teachers use assessments to check where any learning may have been lost or not secured from the previous term and integrate this into the plan.
- Teachers use the LTP to teach and engage scientific activities that build learning over time.
- Teachers base each week on a sequence of learning objectives, answering a key question and engaging with purposeful, rich experiences. They plan for activities that best help children to make sense of the experience and develop meaningful learning which can be taught and applied across the contexts in that week.
- The planned sequence of teaching and learning is that of a Scientific Process and skills (see table below): Big questions, children to explore, perform investigative practical work and solve problems through challenge and deeper thinking.
- This takes the shape of a Big question, enquiry experiences, opportunities to link up vocabulary and previous knowledge, children taking the lead in responding to the experience further, children to ask and answer their own questions, teaching skills to help with this response and opportunities to practise practical enquiry and rehearse and self, peer and teacher assess.
- Planning is monitored by the head teacher and her/his team, meeting with each year group to question, challenge and ensure teachers are ready to teach in line with the Science Curriculum Policy and the Long Term Plan.

Pupils will be encouraged to develop the skills of:

Exploring and observing at first hand using all their senses.	Communicating scientific ideas orally, in writing and diagrammatically
Raising questions	Collecting data
Planning investigations	Interpreting scientific data
Predicting	Fair testing
Formulating hypotheses	Explain using scientific knowledge
Problem solving	Explaining and using scientific term
Evaluating	Sorting and ordering
Estimating	Drawing conclusions
Accurate measuring	Challenge/ deeper thinking questions



## Short Term Planning

- All teachers will use OneNote to produce their weekly science lessons where whole class teaching focus using small steps in the LTP, big questions, other key questions, and opportunities for Assessment for Learning and key vocabulary will be modelled using the Kent Scheme of work (Andrew Berry).
- At the start of a science lesson there should be pre-assessment using a Do now.
- These will be amended and updated based on assessment for learning and the needs of the class.
- Stimulating practicals and scientific investigations should be purposeful and related to the real world.
- The Deepening Understanding website and the Diagnostic Questions website can support assessment.

## Timetable

- Key Stage 1 and 2 plan for around 2 hours a week of Science and additional time as well as through cross-curricular aspects of other lessons. This ensures specific skills and knowledge are taught discretely and mastered across contexts over time.
- EYFS plan for around 10-20 hours as part of well-planned child-initiated play as well as more discrete teaching opportunities and through cross-curricular approaches in other parts of the day.

## Teaching a typical lesson will include:

In order to provide the children with active and stimulating learning experiences, a variety of teaching and learning opportunities are adopted:-

- Learning based on the carefully thought through Medium Term Plan.
- An engaging experience, a meaningful purpose/context, rooted in key learning – answering a big question and engaging with purposeful and rich scientific experiences and drawing on previous scientific knowledge and learning new scientific knowledge.
- A stimulating input where the teacher models or guides children, preparing them for a challenging and engaging use of scientific knowledge.
- Teachers use carefully planned questions throughout the lesson in order to meet the needs of all abilities. Self-differentiation is used regularly in order for children to challenge themselves.
- A challenging and inspiring practical or written activity that utilises the scientific knowledge in order to gain understanding and demonstrate it.
- Purposeful use of spaces in classrooms, outside areas, local community areas and on school trips. Use learning environments in new and purposeful ways to maximise learning.
- Key Scientific Vocabulary explicitly taught frequently used and linked to other words, root words, meanings and contexts. Teachers insist children use this when speaking and writing throughout the lesson.
- Quality language throughout all aspects of the lesson so no learning time is wasted, but maximised.
- Teachers value pupils' oral contributions and create an ethos in which all children feel they can contribute.



- High expectations of literacy and numeracy skills, including presentation, handwriting and spelling.
- Explicit links to how the child is being an effective learner (e.g. collaborating) or future citizen of our country (e.g. making a positive contribution to the local area through the care and understanding of plants and animals).
- Constant opportunities for children and adults to assess the learning and adapt the lesson accordingly.
- An element of scientific risk is provided in how children may respond to a practical to best suit their needs as well as the needs of the curriculum.
- Self-differentiation so all the needs of the children are met in order for them to meet the learning objectives with appropriate challenge for all, without limiting the child, but removing barriers and maximising opportunities to learn deeply.
- In KS1, a Continuous Provision approach to learning will take place.

### **Meeting the Needs of ALL Children**

- Teachers to be knowledgeable about the child's needs the science curriculum, the expectations for that year and strategies to get to that level.
- Teachers to be relentless in following through with high expectations for pupils working below or with SEN e.g. adapting lessons from questioning or through tasks at the start of lessons or maybe catch up stay up approaches at key points in a day if needed.
- Children working below or with SEN should still be challenged - The task can be broken down or started with more scaffolding or in a simpler form but must always lead and build to the point of cognitive struggle for learning to take place.
- Children working above should still be challenged and not be content with covering the learning objective. Instead, be satisfied only when they too have built to the point of cognitive struggle for learning to take place. Often this requires a greater amount of combined knowledge and skill applied to problems that are more sophisticated.
- We have designed the curriculum with a model of Learning and Remembering in mind so concepts and processes are meaningfully repeated with the aim to secure these in longer-term memory to be developed further each time it has revisited or built upon. This benefits all children.
- We recognise that some children working below or with SEN may require further repetition and practise to become fluent.
- Teachers must know the links they can help children make by learning the curriculum and long-term plan. Planning smartly from this is important, deliberately planning for and teaching links so concepts are woven together cohesively within the day and over the week as well as over the term and year.
- This can be challenging though when some of our most vulnerable children have additional Nurture provision or Booster Groups or Interventions with adults who may not be informed enough to help teach these links in other contexts. Communication with all adults is key so adults are informed to inform children of what they will need to learn when they return to class or targeted by the teacher the next lesson. Rotate the times when children are taken from lessons so they get a balanced experience rather than missing the same part of a lesson every time.
- Leaders to be relentless in tracking these children and ensuring the intent is implemented and then sustained over time for clear impact evidenced in the digital exercise book, lesson observations and from child interviews. It is helpful for Book Looks and lesson observations to be done with some of these children in mind and revisited.



## **Equal Opportunities**

All pupils will have equal opportunity to reach their full potential across the foundation curriculum regardless of their race, gender, cultural background, ability or physical ability. The school's equal opportunities policy applies to the teaching of Science as to all other subjects.

## **Use of ICT**

Pupils are taught to use a range of ICT equipment to enhance their scientific learning and all work for KS 2 children will be presented in their digital exercise book and in KS1 through Tapestry. Other IT equipment includes 'Digi blu' cameras or scientific microscopes to record investigations, data loggers for accurate measurements of temperature and digital microscopes for close observation.

Programmes such as Excel are used to create graphs and charts to record results and ChatterPix for Scientists of the term. iPads are used, in year groups where available, to support and enhance learning activities.

## **Impact**

### **Assessment throughout lessons**

- Teachers are required to develop a breadth of evidence relating to children's achievements. This is to be done through observation, quality questioning, children's explanations, children's demonstrations of knowledge and skills, listening in to conversations, comparing examples of children's work in science books or big science class book used by group or class, peer assessment, self-assessment and by filming the children and playing it back to them for immediate reflection and feedback.
- Record key learning and decisions on the Distance Marking sheet.
- Marking should include positively phrased comments, including successes and next steps. Developmental marking strategies should be used in line with the Feedback & Marking policy.
- The use of film and photos are vital for recording and measuring progress in practical elements of a lesson. By filming children at the start and the end of scientific process, progress will be easily captured.

### **Assessment each term**

- This is to be reviewed every term.
- Class teachers regularly update Target Tracker statements, assessing every pupil against the objectives from the National Curriculum.
- Progress against Target Tracker statements will be carefully monitored, alongside progress in learning in children's books
- At the end of each term, class teachers will input a science level (based on the Target Tracker steps) into Target Tracker.



- The amount of progress made and percentages of those children on track to reach National Curriculum end of year targets will be analysed and discussed at termly data meetings. Progress from Key Stage 1 will also be closely monitored in Key Stage 2 classes. This will also be discussed at 1:1 assessment and SLT Strategy meetings.

An update of science attainment is provided annually to parents on the end of year report.

### **Termly moderation meetings**

The process of moderation is an essential part of a robust assessment system. Teachers are involved in moderation of EYFS, and core subjects in KS1/2 in the following ways:

- With colleagues in school during year group meetings
- With colleagues in school during professional development meetings
- With colleagues from the collaboration (termly timetabled sessions)

### **Monitoring & Supporting Science Teaching & Learning**

- Each term the Headteacher will develop and undertake a monitoring schedule. This will include work and planning scrutiny, professional dialogue with teachers, assessment monitoring, children conferencing and lesson observations. The School science leader will inform the Headteacher of the outcomes of their monitoring and monitoring will be used to identify areas of strength and where learning can be better developed in the future.
- Each year the school science leader will check that every class has covered the aspects of science as indicated in the long-term plan.
- The school science leader will monitor the use of science resources (things, people, places and spaces, including appropriate use of ICT) throughout the year.
- The Trust science leader and school science leader, with support from all other staff, will ensure that there are adequate amounts of resources, and that all of these are stored in a manner that makes them easily accessible to all.
- The school science leader will maintain a record of wider opportunities that have been provided for the children.
- The science leader will support colleagues with identifying ways to enrich the coverage of the science learning. This could include visits, visitors and competitions.

### **Resources**

- Class teachers are responsible for informing the school science leader of resources, which are required in order to deliver their planned topic.
- Resources are shared across the Trust.
- Information books on science topics are available in the school library and a range of non-fiction texts relating to science topics are available in classrooms and as part of the guided reading resources within the school.
- The whole school environment is used to maximum potential in order to support delivery of the science curriculum.
- School visits and extra-curricular activities are planned regularly to enhance learning and help the pupils to relate scientific enquiry to the real world.
- The outside environment is used to supplement artificial resources wherever possible.

### **Health & Safety**



- The safe use of equipment and materials is promoted at all times. The school as a realistic guide to primary school Health and Safety have adopted the Association for Science Education document '**Be safe**'.
- All offsite visits or activities will require a risk assessment to be completed.
- **CLEAPSS** will be contacted by teachers should they have a query concerning health and safety.
- All accidents and incidents are reported to the Headteacher.
- Teachers are responsible to ensure any investigations carried are done so in a safe way for the protection of their class

### **The role of the School Science Leader**

- To undertake monitoring of standards in science and use this to inform the science action plan.
- Provide leadership and management of their subject to secure high quality teaching and learning.
- Attend termly Science leader meetings.
- Play a key role in motivating, supporting and modelling good practice for all staff, including the organisation and presentations to staff for training.
- Take a lead in policy development and review
- To liaise with outside agencies and attend subject specific courses.
- To report to the Head teacher and Trust Science Lead on science related issues.
- To plan and organise the allocation and purchase of resources in accordance with available budget.

### **Policy Review**

*The Board of Directors reviews and approves this policy every year. It may, however, review this policy earlier than this if the government produces new regulations, or if it receives recommendations on how this policy might be improved.*

*This policy will be reviewed June 2022.*

