Science Policy

Introduction

At Saltersgate Junior School, we encourage children to be inquisitive throughout their time at the school and beyond. The Science curriculum fosters a healthy curiosity in children about their universe and equips them with motivation to seek explanations for these. We believe science encompasses the acquisition of knowledge, concepts, skills and positive attitudes, therefore we facilitate this through enriching, creative lessons/experiences, whether it be in or out of the classroom. Throughout this programme of study, the children will start to develop their knowledge and skills in a range of areas, this will be progressively built upon throughout the following years to ensure that knowledge is revisited and extended further. The principal aims when working scientifically, are that skills are often visited and developed throughout children's time at the school so that they can apply their vocabulary and knowledge of science when using equipment, conducting experiments, building arguments and explaining concepts confidently and challenging ideas.

We recognise the fact that we have children of differing scientific ability in all our classes and so we provide suitable learning opportunities for all children by having mixed ability classes, differentiating the tasks given and providing appropriate challenge /extension to learning with the intention to stretch the children's knowledge further. We believe that giving the children the knowledge and the ability to explore concepts will support them in future enquiries and have a greater understanding of the world that they will actively participate in.

Science Curriculum Intent, Implementation and Impact Overview

Our curriculum closely follows the aims of the National Curriculum for Science 2014. 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.

School has identified key intentions that drive our maths curriculum. At Saltersgate Junior School our science curriculum intentions are:

Intent	Research Link	Implementation-	Impact-
At Saltersgate, our initial intention is for **all** pupils to have a love for science and for **all** pupils to become **inquisitive, challenging** concepts about the world that they live in. The science curriculum should have a degree of autonomy and should be accessible to **all** learners. We are committed to ensuring children recognise the importance of science; having an appreciation of how it has changed our lives as well as impact the World's future prosperity. It is our aim to develop a sense of excitement/curiosity about natural phenomena. It is our aim to develop pupils' **curiosity** about the subject and to	**OFSTED Curriculum Research indicates that:** 'A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. 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. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.' (**Ofsted, 2013**)	*** Teaching and Learning** **Y3/4** In lower key stage, our main focus is to ensure that the children are exposed to scientific vocabulary, become inquisitive when investigating scientific concepts and have the ability to explain/ represent their findings. In lower key stage, the primary focus of Science teaching is to ensure pupils are equipped with the knowledge of different investigative methods which they can call upon when carrying out a range of scientific enquiries. The expectation is that they are able to ask relevant questions based on the area of study and set up simple but practical/ comparative enquiries that take into consideration fair testing at all times. Additionally,	*** Enrichment** At Saltersgate, we use a wide variety of quality resources to motivate and inspire our children. We have built our bespoke curriculum to ensure that the curriculum fits the children and provides them with experiences/opportunity that they might not have access to through organisations such as stem, Zakon and links with Doncaster Hub. * Our intention for science at Saltersgate is that we continue to 'teach to the top' which means that our attainment at the end of KS2 continues to be above that of Doncaster and the national average. * Children will have a greater understanding of the world around them and maintain an inquisitive mind-set where they will continue to challenge any information that they are presented with.

nurture a resilient attitude where they ask and answer many questions. At Saltersgate, we want our scientists to be able to apply their mathematical knowledge to their understanding of science, including collecting, presenting and analysing data. As well as being able to utilise and extend their specialist vocabulary to provide rational explanations of scientific processes.	**Enhancement - Education Endowment Fund research (Improving the teaching and learning of science, 2017)** 'The strongest factor affecting pupils' science scores is their literacy levels. Poor literacy skills can affect how well a pupil is able to understand scientific vocabulary and to prepare and engage with scientific reports. This suggests that strategies to boost disadvantaged pupils' reading comprehension could have a positive impact on their achievement in science too.' **Therefore, as a school, vocabulary and the cross-curricular links with English are paramount to ensuring that the children have a conceptual understanding the scientific elements that we teach. We plan to link the writing revolution approach in English to Science.** **The Writing (In Science)Revolution, 2019** 'Being an active part of their writing education allows you to glean more effectively the current understanding that students have of a particular topic. And by understanding, not just recalling individual ideas or facts	they are required to work systematically and make careful observations when conducting investigations; providing accurate recordings of measurements; choosing the most appropriate equipment to do so. Throughout their learning, they should be researching, gathering, classifying and presenting results to display their conclusive data. When recording their data, the children can utilise their mathematic knowledge as they are required to record their findings using keys, bar charts and tables that incorporates simple scientific language. All children should be able to draw simple conclusions based on evidence, look at comparisons across the data and suggest improvements to make their results more accurate. **Y5/6** The principal focus is to ensure pupils deepen their understanding	

	(although this is naturally part of it), but the expression of the links between them.' Additionally, we aim to give the children more autonomy when working scientifically as EEF states that: **Enhancement - Education Endowment Fund research (Improving the teaching and learning of science, 2017)** **'**There is good evidence, that the ability to reason scientifically – by testing hypotheses through well-controlled experiments – is a strong predictor of later success in the sciences and that this skill can be developed through programmes that allow pupils to design experiments that require them to control variables. Many effective programmes give teachers training to guide their pupils' scientific reasoning by setting questions that can be investigated and getting them to design fair tests.'	of a wide range of scientific ideas. They are expected to explore and discuss their ideas, using specific scientific vocabulary and analyse functions, relationships and interactions methodically. At upper key stage 2, they should encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. 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. ***Lesson Structure** At Saltersgate, we have designed a bespoke curriculum where each term,	

		every year group will aim to answer/explore a question as part of their topic work. Their topic work ensures that cross curricular links are made, and that clear progression in skills throughout the different year groups are visible. Science is regularly visited throughout the term and is linked with many other subjects to ensure that the children retain the knowledge/skills they have learnt. Each lesson focuses on **<u>one clear learning objective</u>**, which all children are expected to master; extension activities enable those children who grasp the objective rapidly to extend their learning by exploring it in greater detail. Each lesson includes the elements of: **pre-assessment/consolidation of prior learning, developing understanding ,and exploration of the subject area through scientific enquiry.** Planning is taken from the National Curriculum and Stem.org. However, teachers may adapt units accordingly. Currently, Y3 work in mixed ability classes whilst 4, 5 and 6 are in ability groupings. Within the class/group, children collaborate in KAGAN pairs.	

		* **Learning Walls** In each classroom, science is displayed in different ways with there being a focus on key knowledge and vocabulary which enable pupils to make links across the wider curriculum**.** The interactive displays provide a platform for the children to pose questions about their scientific area of study but also provide explanations/ answers for their peers. *** Subject specific vocabulary** Identified through knowledge organisers and learning walls and highlighted to the children at the beginning of lessons and revisited through cross-curricular links and whole school projects. *All pupils to be encouraged to use scientific language and full sentences when explaining their reasoning.* . * **Assessment** Each lesson, teachers recap prior learning using a knowledge recap grid, which could incorporate knowledge that could have been acquired in previous years or in previous lessons. This continuously recaps their learning to ensure that	

		the children are retaining the information that they have learnt and continue to develop their skills further. Class teachers assess children's understanding in Science using a RAG, self and peer-assessment and supported pupil reflections and this is then recorded formatively and summative using FFT. This data is then analysed to improve the children's learning in science. * **Outdoor learning** We recognise that children learn in a variety of ways, and so where appropriate, we will encourage children to extend their learning beyond the classroom and take lessons outdoors/ utilise the facilities of external organisations. * **Approaches to teaching** We use a metacognitive approach to teaching and learning so that children build resilience and aim to become self-regulated learners. Teachers model their thought processes and scaffold learning so that all pupils are able to access the science objectives and make appropriate progress. Through this, they are assisted in making their thinking clear to themselves as well as to others and teachers ensure that	

		pupils build secure foundations by using discussion to probe and remedy any misconceptions. Building on this ethos, we teach science using a range of strategies which include: ● *Group Discussion* – Children discuss and interrogate new ideas in a small group or whole class setting using a variety of Kagan mixed ability learning models. They listen to and value each other's ideas whilst taking on board feedback so as to improve their own explanations. ● *Partner Discussion* – Children work in pairs to discuss their ideas. They are able to explain their scientific thinking and be ready to convince, justify or amend their answer. At Saltersgate, we believe a rich, purposeful discussion is the key to success. ● *Questioning* – Using scientific vocabulary, teachers use a range of questioning strategies to establish children's current understanding and develop their learning. Open-ended questions are used to elicit a deeper understanding to provoke scientific discussion. ● *Modelling and Scaffolding* – Teachers use clear models (concrete, pictorial then abstract) to introduce a learning objective. Time is allowed for pupils to explore areas of study in pairs/groups	

		before they are expected to justify their ideas.	

Pedagogy

	In science, like all other subjects, we recognise the importance of the methods and practice of teaching (the pedagogy) we choose to use in enabling pupils to know more, understand more and remember more. In science, the following approaches will be used, and be evident in pupils' books, in order to ensure that the learning opportunities are as effective as possible and that pupils progress throughout the year and across year groups during their literacy experiences in school:				
Teaching Sequence in Numeracy	**Big Picture/question**	**Placing of scientific skills that is being taught.**	**Possible pedagogical approaches used in Numeracy**	**Behaviourism**	**Direct teacher instruction; modelling of skills and techniques; demonstration**
	Daily Review/Recap grids	**Brief review of learning covered in previous lesson/s**		**Constructivism**	**Enquiry-based learning; outdoor learning**
	Vocabulary	**Specify key vocabulary to be used and its meaning. Check which words pupils understand.**		**Social Constructivism**	**Teacher modelling; questioning; mix of individual, paired and group instruction**
	Modelling	**Teacher modelling of new skills or concepts – including 'thinking aloud'. Clear annotations and any written methods used as per policy. Simple clear steps.**		**Liberationism**	**Pupil-led learning; opportunities to showcase learning**
	Collaboration	**Children practise the new skill using shared, paired or group task**		**Learning, working and talking like a Scientist.**	**High expectations of use of Scientific vocabulary. Pupils explain, justify and convince others.**
	Scientific Talk	**Children communicate their scientific knowledge and understanding appropriately using independent strategies**			
	Plenaries	**Reflect on and evaluate their learning and compare**			

		with previous knowledge as appropriate			

E-safeguarding
The science policy and scheme of work adheres to the whole school E-safeguarding Policy.

Equal Opportunities
Science follows the school's Equality Policy.
All children have equal opportunities to reach their full potential across the English curriculum, regardless of their race, gender, cultural background, and ability, or of any physical or sensory disability.

Links to other Subjects
At Saltersgate Junior School, we use science to promote learning across many areas of the National Curriculum, including:

* The application of all basic skills (including Maths, Reading and Writing) within the science curriculum
* The use of computing to find, present and use scientific data.
* Citizenship, through moral, social and cultural development.
* Developing language skills, through scientific talk.
* Application of number, through historical research and enquiry.
* Developing geographical knowledge when learning about past phenomenon.
*Within every science topic, pupils will also develop their mathematical skills.

Any cross- curriculum links between subjects are identified in medium- and short-term planning, and children are made aware of them.

Links to Spiritual, Moral, Social and Cultural Development

Pupils' spiritual, moral, social and cultural development equips them to be thoughtful, caring and active citizens in school and in wider society. Leaders consistently promote fundamental British values and pupils' spiritual, moral, social and cultural development.

Science lessons teach a range of age appropriate literature that enhances spiritual development through discussion, debate and wider cross-curricular links.

Organisation of Teaching

Science at Saltersgate Junior School is taught through discrete lessons, the order of which are planned using the 2014 National Curriculum.

Teaching Methods

Although the approach is used throughout, we use a variety of teaching methods at Saltersgate Junior School, in order to suit as much as possible, the abilities and interests of our pupils.

These include:
*Daily problems/open ended questions to evoke critical thinking and exploration.
* Individual and group investigations and problem-solving activities.
*Recap challenge grid
* Outdoor Learning, including the forest school area.

Plenaries should occur regularly throughout a lesson.

Reasonable Adjustments in Numeracy and Inclusion

The curriculum leader in Science recognises the importance of ensuring that children with identified Special Educational Needs and/or Disabilities have access to an ambitious literacy curriculum. Within the curriculum area of numeracy SEND children will be provided with reasonable adjustments through their tasks and level of challenge provided. Advice can be sought from the school's SENDCO where applicable.

Special Educational Needs

Some children experience learning difficulties, which affect their progress in science. Class teachers inform the SENDCO and Inclusion Team if they are concerned that a child may have underlying learning difficulties. Some children then receive SEN support. This may include:

- Pre/Post teach groupings
- Same day intervention
- Concrete resources

Access for all

At Saltersgate Junior School we develop an inclusive curriculum.

Children with English as an additional language

As outlined in the National Curriculum 2014, *'The quality and variety of language that pupils hear and speak are key factors in developing their vocabulary'.* Although this applies to all pupils, it is particularly important that EAL students are equally able to access the maths curriculum so the following will be considered:

1. Access to learning requires attention to words and meanings embodied in each curriculum area. Meanings and understanding cannot be assumed, but must be made explicit.
2. Language is central to our identity. Therefore, the home language of all pupils and staff should be recognised and valued. Pupils should be encouraged to maintain their home language.
3. Language develops best when used in purposeful contexts across the curriculum. The language demands of learning tasks need to be identified and included in planning. Teaching and support staff play a crucial role in modelling uses of language. Knowledge and skills developed in learning the first language aid the acquisition of additional languages. A clear distinction should be made between EAL and Special Educational Needs.

It is vital that children who have English as an additional language have English modelled accurately by all staff at school. Collaborative work with peers (where English is their first language) is essential and EAL children should be provided with consistent opportunities for this verbal

interaction. All teachers include a range of strategies to support children with EAL which includes: teacher and peer modelling and consistent use of visual support, repetition and recasting of language features, word banks and scaffolded speaking and listening activities.

Teachers work with the Inclusion Coordinator to best meet the needs of individuals within their classes. Children who are new to English are assessed and support is put in place by the Inclusion team to help them make rapid progress. In addition, class teachers use their teaching assistants to provide targeted support and the use of home language support and peer-buddying is encouraged.

* Setting suitable learning challenges: It is the aim of the school that children should be given achievable learning targets, and be motivated by success. This may involve deepening children's mathematical skills and understanding, so that all children's learning needs are catered for, and pupils achieve as high a standard as possible.

Responding to pupils' diverse learning needs: Numeracy at Saltersgate is planned so that all pupils can take part in lessons fully and effectively so that there is an equality of opportunity through teaching approaches.

Science at Saltersgate is planned so that potential barriers to learning and assessment for individuals and groups of pupils are overcome. This is achieved through:

* Provision being made where necessary to support individuals or groups of pupils to enable them to participate effectively in English lessons.
* Pupils' understanding being developed through the use of practical resources.
* Aspects of the programmes of study that may present specific difficulties for individuals being identified.
* An inclusive science curriculum is also achieved through:
* One-to-one reader where appropriate
* The use of alternative communication methods e.g. ICT or speech to communicate thinking.
*Practical/pictoral resources

High Achievers Children (GDS groups – Greater Depth of Study groups)

GDS pupils who achieve highly in science will be supported and given opportunities to deepen their knowledge and skills through differentiation.

As identified in the National Curriculum 2014, *'Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content.'*

At Saltersgate, we recognise that all pupils can work at greater depth and the breadth of activities should allow all pupils to achieve highly in a lesson.

Planning

From Y3 – Y6 the school uses a range of resources, developed in school or adapted from the STEM and Association for Science Education used as a foundation for creating our own exciting and varied science lessons. These help to ensure that coverage of the National Curriculum is secure and that year group expectations are met. Teachers also ensure that, wherever possible, science lessons are linked with core subjects as well as incorporating their topic work. There are also science resources stored throughout the school which are used on a regular basis. The library contains fiction and non-fiction books and is used by children from Y3-Y6.

Where possible science lessons will have a cross-curricular approach and support work done in other areas of the curriculum when topics allow close links. Discrete science knowledge and skills are woven through these lessons to make sure that children are able to develop mastery of the National Curriculum objectives.

In Years 3 – 6, science lessons take place in block weeks and are taught to the whole class by the class teacher. They are effectively scaffolded to ensure that every child can be successful in their achievement of the learning intention, with high expectations for all learners. Success criteria are shared with the children prior to independent work and these also indicate how greater depth can be achieved and demonstrated. These lessons cover knowledge, methods, processes and uses of science.

Assessment

Children are assessed formatively through thorough questioning and marking to ensure that teachers understand where children are currently in their learning and what their next steps need to be. Children are also supported to self-assess and peer assess in order to develop their own knowledge of their next steps in learning and begin to articulate where they have found difficulties or strengths. This helps to ensure that maximum progress is made throughout science teaching across the school. This formative assessment is recorded using the school's online assessment tools.

In addition to this, regularly timetabled summative assessment opportunities are planned into the academic year to ensure that the progress in knowledge and skills that each child makes is accurately measured. Summative assessment opportunities are used to support teachers in their assessment judgements and should not replace teacher judgement based on experience of the child in everyday lessons.

The data is the analysed by the ELT, science lead and class teachers.

Targets
At Saltersgate Junior School, we aim for the majority of pupils to:

* Be at age related expectations for Key stage 2 by the end of year 6
* Be above age related expectations for Key stage 2 by the end of year 6 for a significant proportion of pupils

Responsibilities
The role of the subject leader in science is to coordinate the teaching of science across all phases of the school. This is in order to secure high quality science provision for every child, including outstanding teaching and learning of science, effective use of resources and the highest standards of achievement for all.

Some key duties that the maths subject leader should undertake over the course of the year include:

● Monitoring and effective feedback of science work.

● Learning walks and other lesson observations with effective feedback given in a timely manner

● Planning and organising science enrichment opportunities and competitions

● Helping identify and facilitate the professional development needs of staff so that lessons are never less that good, and that most are outstanding in science

● Liaising with ELT to help implement school improvement priorities

● Liaising with the school SENDCO and Inclusion Manager to best support children with difficulties

● Organising, maintaining and cataloguing resources

● Keeping abreast of new initiatives in science teaching

Staff Development
Over the course of the academic year the science subject leader monitors and evaluates:

* The attainment and progress of pupils in science
* The pupils' response and attitude to science
* The quality of science teaching in school
* The quality of children's work in science

This is achieved through:

* Classroom observation of science, including learning walks, with written feed back
* Questioning of children during these observations
* Discussions with pupils
* Carrying out regular scrutiny of work, and feeding this scrutiny back to teachers.
* Looking at science learning displays in classrooms and corridors.
* Monitoring each teacher's science planning every term, as appropriate, and providing written feedback.
* Keeping all staff informed on changes that effect science in school.
* Attending any science Subject Leader meetings arranged by the LA or other providers.

Subject Development
Over the next academic year, the science leader will write and execute the school development plan in science.

In addition to this the science leader will also:

* Ensure the subject of science meets statutory requirements of the national curriculum.
* Continue to monitor the implementation of the science scheme of work.
* Continue to monitor staff development in science, through classroom observations if appropriate, staff questionnaires, monitoring and feeding back on medium term planning and children's work.

* Attend appropriate courses, if available, to develop personal knowledge and expertise, and to share this in school.
* Complete pupil discussions with pupils from a range of classes, on how science is delivered in our school.
* Maintain the science section of the school website for all stakeholders.
* Monitor and evaluate the quality of science resources in school, and bring in new resources as appropriate.

For a detailed description of the development of science in the next academic year, please see the 2019 – 2020 School Development Plan.

Parents

We recognise how crucial the home/school link is for supporting children to have the highest standards of achievement in science. At the 'New to Year 3 Parents' meeting at the beginning of every academic year, the science standards of the school are explained, as well as further meetings throughout the year with all parents to support their understanding of new science initiatives. There is a further meeting in Y4 to explain the multiplication test and then one at the beginning of Y6 to go through the expectations of the SATs testing. In addition, parent workshops are arranged, in year groups, to go discuss written methods, particularly with regards to the multiplication and division of fractions.

Homework is also part of the school's successful maths home/school link and is set every Friday to be due the following Friday. The homework focuses on improving number fluency.

Review

This policy is a live document, being constantly updated. Science has long, medium and short-term development plans, which forms part of the overall School Development Plan, drawn up and executed by the science Subject Leader. This plan will affect the contents of this policy, and it is the responsibility of the science Subject Leader to maintain this.

Revision Date	Revision Version	Previous Revision Date	Previous Version	Summary of Changes
September 2020	New policy	-	-	New policy