

Subject Self Evaluation Form

Subject: Science

School Context

- The socio-economic circumstances of the pupils are better than the average nationally although lower than the other schools in our local cluster.
- The proportion of pupils eligible for a free school meal is slightly below average (although in Year 6 last year we had 30 per cent of children eligible for PPG which is above national average). In addition, many families are on low incomes.
- The majority of parents are supportive but a significant minority have low aspirations and this has an impact on their support for their children's academic progress and on the extent to which they become involved in their children's learning. As a result of this, some of the pupil premium supports these families financially through clubs and educational visits.
- We have identified that 25% of our pupils have home lives that may negatively affect their school life and sometimes their ability to thrive (adverse childhood experiences). Significant work is completed to support these children through learning mentors and our school listening service as well as more recently employing a family engagement champion, who works with our most vulnerable children on improving attendance.
- A significant minority of our families live in the flats surrounding schools in overcrowded accommodation without access to a garden. We regularly support these families with food and clothes bank referrals as well as working with the local council to provide furniture or apply for more suitable housing.
- Unfortunately, we have had a high number of parents within our school community who have died or have been diagnosed with a life limiting condition. Within the last three years, we have had eleven children who have had a parent who has died. We have received support from charities like Winston's wish and our school educational psychologist.
- The largest ethnic groups are White British (75.98%) and any other white background (16%). Mixed White & Asian (1.44%), Mixed White & Black Caribbean (1.15%). Mixed White & Black African (0.92%), Mixed any other mixed background (2.07%). The percentage of children who are not white British has increased by 6.2% since last year. This school has 12 out of 17 possible ethnic groups. The average number of groups for this phase of education is identified as 9 so we like to celebrate our cultural diversity.
- We are an inclusive school. In 2018, the school was in the top 20% of all schools for the proportion of SEN with EHC/statement (3.2%).
- Staff retention is very high. This means the shared vision and ethos is well-developed as staff have built this vision with staff team. Monitoring, evaluation and review has happened in a cycle where each subject has a deep dive on a rolling programme which has happened for the past 12 years so experienced subject leaders know their subject's strengths and areas for development well.
- School is part of a number of excellent partnerships including being a founder member of SAT so we benefit from excellent links to secondary education which has supported the development of our curriculum e.g. internship programme.

Baseline

Understanding the world 60% EXS+ 8% GDS

Listening 72% EXS+ Listening 29% GDS

Speaking 67% EXS+ Speaking 17% GDS

Understanding 74% EXS+ Understanding 25% GDS

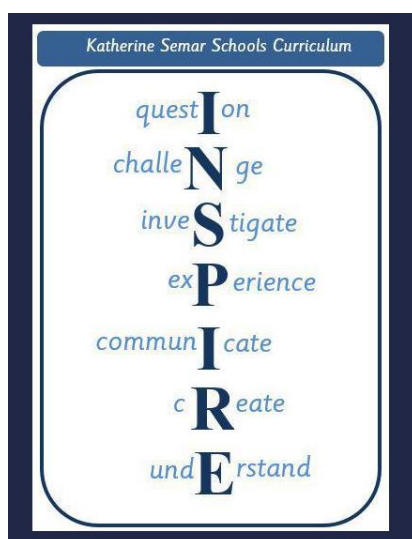
School vision

School Values

Our curriculum cannot be separated from our school's core values: be kind, be confident, be curious, be positive, be respectful and be resilient. These permeate all aspects of school life and underpin our school curriculum. Although these are directly taught within our curriculum they are also 'lived' throughout our school and effectively create the culture that allows our curriculum to be successful.

Curriculum Aims

Alongside our school values, we have a set of aims for our school curriculum. These are the key threads that underpin and link our children's curriculum experiences together. We want children to: question; challenge themselves and each other; investigate the world around them; experience the world first hand; communicate effectively; and seek to develop their understanding of themselves, each other and the world around them. These aims were developed by and for the school community; parents, teachers, staff and governors collaborated to create our INSPIRE curriculum aims.



Intent

Purpose

Our high-quality science curriculum provides the foundation for understanding the world. Science has changed our lives and is vital to the world's future prosperity; all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science.

Our science curriculum aims progressively to build up a body of key foundational knowledge and concepts appropriate to age and stage of our pupils. Pupils are encouraged to recognise the power of rational explanation and dialogue and develop a sense of excitement and curiosity about natural phenomena. They are encouraged to understand how science may be used to explain occurrences, predict how things will behave, discuss and analyse causes. Children are encouraged to use enquiry and curiosity to question and test their ideas. At KSS we are developing and following an enquiry based science curriculum based around a key blend of knowledge and scientific skills in order to use practical work to help pupils to learn substantive knowledge..

Our 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.
- Ensure they are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.

Implementation

Science long term plan

- Each year group will teach the areas of Science identified in the school's long term plan to ensure coverage of statutory knowledge and skills.
- Each year group will teach all areas of Working Scientifically through planned investigative work, as identified in Year Group planning.
- The school's Science progression of skills will be used to identify the learning objectives for each year group, in line with the school's raised expectations.

Cross-curricular learning and real world contexts.

- Wherever possible, a cross-curricular approach will be taken to the teaching of Science. Lessons will often be linked to children's learning in English, Maths, Computing, Geography, PSHE etc.

Topic launch and land

- Each half term topic will begin with a cross-curricular launch event to engage and motivate the children. This will also act as 'knowledge harvest' allowing teachers to assess children's existing knowledge and skills in order to adapt planning and ensure appropriate levels of challenge for all children.
- Each half term will end with a land event which celebrates children's learning and progress. This will involve the children communicating their learning in some way, for example exhibitions or assemblies.

Fieldwork

- We understand, through analysis of relevant research, that fieldwork is an essential element of an outstanding Science curriculum and therefore ensure it is a high priority for all learners.
- Fieldwork is carried out in every year group across the school and the skills progression ensures children gradually build their fieldwork skills across the school.

Challenge and Support for all Learners

- We understand that every learner develops differently and adapt our provision continuously to ensure every child receives the correct balance of support and challenge in order to achieve their very best. We recognise this fact and provide suitable learning opportunities for all children (including those who may be gifted and talented or have additional needs) by matching the challenge of the task to the ability of the child. Each child is valued, respected and challenged regardless of ability, race, gender, religion, social background, culture or disability.

Assessment

- We use MAPP (Mapping attainment and progress for pupils) to assess children's progress against the expectations of our INSPIRE curriculum. We assess children against both the requirements and standards of the National Curriculum as well as our school's own raised expectations for all children. We assess them in working scientifically as well as their knowledge and understanding in each aspect of their study.

Scientific Knowledge and Conceptual Understanding, Spoken Language and Development of Higher-order Vocabulary

- Our scheme of work aims to develop scientific and conceptual understanding through a sequence of knowledge and concepts. However, we also believe that it is vitally important that our pupils develop **secure** understanding of each key block of knowledge, vocabulary and concepts in order to progress to the next stage. For this reason we have developed knowledge organisers to identify the key learning and Tier 3 vocabulary for each unit of work. These have been developed systematically across KS1 and KS2 collaboratively with the aim to avoid insecure, superficial understanding and will develop understanding of higher-order content. Pupils will be able to describe associated processes and key characteristics in common language but also be familiar with and use technical terminology (Tier 3) with accuracy. The knowledge organisers allow for a build-up of extended specialist vocabulary.
- Our science curriculum is also planned to enable children to apply their mathematical knowledge to their understanding of science. In all key stages, children apply mathematical skills including collecting, sorting, presenting and analysing data.

The nature, processes and methods of science

- 'Working scientifically' specifies the understanding of the nature, processes and methods of science for each year group. It is not taught as a separate strand.
- Each unit of learning is planned to incorporate key features of scientific enquiry (such as observing over time, pattern seeking, identifying, classifying, grouping, comparative and fair testing, and researching using secondary sources).
- Pupils learn to use a variety of approaches to answer relevant scientific questions.

High-expectations

- Our curriculum is designed with the national curriculum as a starting point but as we have extremely high expectations for our children so we have added additional challenge. These can be seen in the bold objectives in our INSPIRE curriculum. Although there is no requirement in the national curriculum, in order to give children an opportunity to begin to think how key concepts in forces and electricity affect our everyday life, we introduce our Key Stage 1 children to Forces within our Wheels, Wings and Wonderful Things topic in Year 1, and to Electricity with the Lighthouse Keeper's Daughter topic in Year 2 as part of DT. In addition, we have used our Forest School, trips and outdoor environment to enrich our learning in science.

Impact

Working Scientifically:

	KS1	KS2			
<u>Whole Cohort</u>			<u>SEN</u>		
Total	119	255	Total	7	17
Foundation%	0.0%	0.0%	Foundation%	0.0%	0.0%
Working Towards%	6.7%	13.0%	Working Towards%	20.0%	55.4%
Expected + %	93.3%	87.0%	Expected + %	80.0%	44.6%
Higher Standard%	18.6%	43.2%	Higher Standard%	0.0%	12.5%
<u>Pupil Premium</u>			<u>Not SEN</u>		
Total	18	38	Total	112	238
Foundation%	0.0%	0.0%	Foundation%	0.0%	0.0%
Working Towards%	17.5%	36.6%	Working Towards%	5.3%	9.9%
Expected + %	82.5%	63.4%	Expected + %	94.7%	90.1%
Higher Standard%	5.0%	13.2%	Higher Standard%	20.1%	45.5%
<u>Not Pupil Premium</u>			<u>EAL</u>		
Total	101	217	Total	14	35
Foundation%	0.0%	0.0%	Foundation%	0.0%	0.0%
Working Towards%	5.0%	10.3%	Working Towards%	8.3%	22.5%
Expected + %	95.0%	89.7%	Expected + %	91.7%	77.5%
Higher Standard%	21.2%	48.3%	Higher Standard%	0.0%	38.8%
			<u>Not EAL</u>		
			Total	105	220
			Foundation%	0.0%	0.0%
			Working Towards%	6.7%	11.3%
			Expected + %	93.3%	88.7%
			Higher Standard%	20.8%	43.9%

Knowledge and Understanding

	Y1 Science	Y2 Science	Y3 Science	Y4 Science	Y5 Science	Y6 Science	KS1 Average	KS2 Average
Total	60	60	60	60	61	78	120	259
Foundation%								
Working Towards%	5	12	10	8	3	5	8	7
Expected + %	95	88	90	92	97	95	92	93
Higher Standard%	25	23	33	25	52	44	24	39

<u>Disadvantaged</u>								
Total	4	8	9	6	9	5	12	29
Foundation%								
Working Towards%	25	38	33	33		20	31	22
Expected + %	75	63	67	67	100	80	69	78
Higher Standard%		13			33	20	6	13

<u>Not Disadvantaged</u>								
Total	56	52	51	54	52	73	108	230
Foundation%								
Working Towards%	4	8	6	6	4	4	6	5
Expected + %	96	92	94	94	96	96	94	95
Higher Standard%	27	25	39	28	56	45	26	42

<u>SEN</u>								
Total	3	4	5	7	7	6	7	25
Foundation%								
Working Towards%	33	25	60	43	29	17	29	37
Expected + %	67	75	40	57	71	83	71	63
Higher Standard%					14	17		8

<u>Not SEN</u>								
Total	57	56	55	53	54	72	113	234
Foundation%								
Working Towards%	4	11	5	4		4	7	3
Expected + %	96	89	95	96	100	96	93	97
Higher Standard%	26	25	36	28	57	46	26	42

<u>EAL</u>								
Total	8	11	7	10	10	15	19	42
Foundation%								
Working Towards%		18	14			13	9	7
Expected + %	100	82	86	100	100	87	91	93
Higher Standard%	50	27	43	20	50	40	39	38

Not EAL								
Total	52	49	53	50	51	63	101	217
Foundation%								
Working Towards%	6	10	9	10	4	3	8	7
Expected + %	94	90	91	90	96	97	92	93
Higher Standard%	21	22	32	26	53	44	22	39

Boys								
Total	29	32	20	29	28	40	61	117
Foundation%								
Working Towards%	7	9		10	4	5	8	5
Expected + %	93	91	100	90	96	95	92	95
Higher Standard%	24	31	35	31	46	50	28	41

Girls								
Total	31	28	40	31	33	38	59	142
Foundation%								
Working Towards%	3	14	15	6	3	5	9	7
Expected + %	97	86	85	94	97	95	91	93
Higher Standard%	26	14	33	19	58	37	20	37

Commentary: needs doing after data gone in.

We have noticed that there is a disparity in KS2 whole cohort between achievement for disadvantaged pupils within WS and K&U. We feel that this due to lack of opportunities for classroom based scientific enquiry during lockdown – however, as science leads, we have worked on strategies with teaching staff to identify prior potentially missed learning before each topic is taught. Our recent and ongoing CPD in scientific enquiry should enable teachers to target working scientifically in a progressive way in order to enable children to become more independent and thus achieved expected levels. We have shared best practice guidance on *substantive learning* (K&U) being delivered alongside *disciplinary learning* (WS). This will enable teachers to select the best scientific enquiry to fit the substantive learning intention, thereby reducing the cognitive load, also giving more accurate and evidence based assessment for end of topic teacher assessments. NB this is ongoing improvement to our science teaching and learning at KSS.

Significant developments in the subject

- Medium term planning format has been rolled out wherein prior and future learning is included, alongside misconceptions and new vocabulary. In addition, each medium term plan should show enquiry icons to show working scientifically focus with explicit planning for teaching disciplinary knowledge.

- Book scrutiny, pupil interviews have demonstrated that pupils are using a wide range of Tier 3 vocabulary with increasing accuracy in discussion and their written work.
- Close liaison for planning with individual year group colleagues.
- Staff survey undertaken to ascertain CPD needs.
- Science vocabulary progression developed (Summer 2021) establishing specific Tier 3 vocabulary to be taught in each year group. This needs revisiting due to slight variations in need following disruption during lockdowns.
- Best practice guide rewritten in light of most recent Ofsted report and subject monitoring.
 - Early years milestones incorporated into subject progression document.
 - Link made with local STEM facilitator with a view to running STEM training for local schools from KSS.
 - Whole School Teacher CPD on use of knowledge organiser and scientific enquiry within SoW.
- Sharing of assessment materials, particularly for working scientifically shared and promoted to all teaching staff.
- Revisit of long term plan and from Autumn 23 Year 6 will now teach the light topic historically moved to Year 5.

Strengths

- Subject leaders CPD – attend regular personal CPD and Science Leader Updates. One subject leader is a STEM Facilitator.
- Both subject leaders have passion and good to excellent subject knowledge, including secondary experience.
- Liaison with secondary school, including transition activities in science with Year 6.
- Ability to access resources from secondary school.
- Subject leaders support colleagues in areas of knowledge and resourcing and teaching pedagogy.
- High level questioning to deepen scientific thinking and enquiry.
- Collaborative learning opportunities amongst peers.
- Staff take many opportunities to plan and deliver ‘hands on’ learning and seek to create an exciting ethos around the delivery of the subject, including hooks such as trips, dissection, creative investigations.
- Clear progression documents for both working scientifically and knowledge as well as Tier 3 vocabulary.
- Four-yearly Science Focus Week. Successful Science Week in 2023, with a huge engagement from parents and SWCHS.
- Big Bang Science Fair (KS2).
- We have a number of links through parents who work in the scientific community locally (e.g. Genome Centre, Astra Zeneca, Cancer Research).
- Children show excitement and enjoyment of science. Science lessons rank in the top third of all subjects in school.
- The development of knowledge organisers for areas of the Science curriculum across year groups has allowed class teachers and leaders to look in depth and revise the skills and knowledge taught in each year group to allow for greater progression. A joint meeting was held with RAB (Spring 2020) to further develop the content required for knowledge organisers for each strand of Science to ensure clear progression.
- Book scrutinies, pupil interviews and class drop-ins have demonstrated that pupils are using a wide range of Tier 3 vocabulary with increasing accuracy in discussion and their written work.
- Early Years milestones have been incorporated into the progression document.

Areas for development

- Further development of use of school outdoor areas.
- To create further opportunities for enrichment and cultural capital eg KS5 pupils / secondary colleagues / visits.
- Greater links to STEM ambassadors.
- To maintain and revisit children's acquisition and retention of tier 3 vocabulary in Science by creative use of high quality knowledge organisers with a clear progression across each area, including knowledge notes (see CUSP materials).
- To continue incorporate aspects of enquiry skills and types within retrieval practice and MTP using a consistent icon system to ensure that children are able to articulate working as a scientist and to ensure that they are KS3 ready at the end of KS2.
- To use the 7 Step Mastery Teaching and Learning Sequence within lessons or units as appropriate.
- To ensure that staff are making use of PLAN assessment documents when making teacher assessments at the end of topics.
- Ensure that teachers are accessing TAPS assessment enquiries to enable consistent assessment practices in working scientifically across the schools.
- In pupil voice (Summer 2), the pupils were generally not confident in naming disciplinary knowledge in terms of enquiry types and skills. A frontispiece for books differentiated for KS1 and KS2 has been developed and forthcoming staff training from science leads will focus on increasing pupils' ability to recognise, choose and name appropriate types and skills in terms of working scientifically.

Monitoring and evaluation systems

At Katherine Semar we believe that the most effective way to monitor the impact of our Science policy is to utilise and triangulate a broad range of moderating activities, involve our stakeholders, and apply these regularly, consistently and robustly. Through our annual Monitoring, Evaluation and Review cycle, we employ the following monitoring activities in Science:

- **Lesson Observations and Learning Walks**
 - Senior Leaders and Subject Co-ordinators regularly undertake planned and unplanned lesson observations and learning walks. These have a clear focus and feedback and findings are used to inform individual and whole-school Continuing Professional Development (CPD), School Development Planning and future monitoring activities.
- **Internal Assessments**

In line with the school's assessment policy, each year group undertakes a range of internal assessments as appropriate to their age and stage of development. Data from these assessments is used to inform planning, teaching, interventions, and adult support to ensure all children are making maximum progress.
- **MAPP (Mapping attainment and progress for pupils)**

We use MAPP to assess children's progress against the expectations of our INSPIRE curriculum. We assess children against both the requirements and standards of the National Curriculum as well as our school's own raised expectations for all children. This is analysed annually and used to inform our school development plan.
- **Work Scrutinies**

- Work scrutinies are carried out by subject coordinators, Senior Leadership Team and whole staff.
- **Pupil Conferences**
 - Every child from Year Two to Six has a learning mentor from the senior leadership team. They have individual pupil conferences each term which supports children to take ownership of their own learning, review their progress and set themselves development targets.
- **Governor Visits**
 - As part of the Governors' Monitoring, Evaluation and Review cycle, lead governors in each subject, make regular visits to school to monitor progress towards the school development plan.
 - Monitoring activities include a range of teaching and learning observations, discussions with subject co-ordinators, meetings with pupils, visits to subject specific celebration assemblies, work scrutinies and subject leader reports.
- **Pupil interviews**
 - Senior staff, subject co-ordinators and governors take regular opportunities to listen to the views of pupils in relation to their experience of Science at our school and their feedback actively informs subject development through our curriculum action plan.

SMSC

Spiritual

- Consider the fact of life, growth, decay and death and how different organisms are dependent upon each other.
- Using senses to become aware of the world around them.
- Appreciating the beauty of the natural world.
- Asking questions about life and its origins.
- Developing a sense of awe and wonder at the complexity and pattern in natural phenomena.
- Being fascinated by how things work and what might happen.
- Encouraging a sense of wonder in scientific discovery.
- Working with 'variables' – learning to test hypotheses, accept failure and try again.
- Learning to value and respect all forms of life.
- Ethical issues – medical, nuclear, environmental and the pursuit of truth in science v value of human life.

Moral

- Looking at good and bad uses of drugs.
- Moral issues in the human food chain.
- Moral issues surrounding animals, including pets.
- Recognising the need for a fair test.
- Exploring the consequences of certain action e.g. decomposition.
- Investigating the laws of nature.
- The scientific skills of making predictions, observing and drawing conclusion are helpful in considering moral issues.
- Consider topics where science and religions both have something to say e.g. about the origins of the world, issues in medical ethics.

Social

- Relating their understanding of science to their personal health e.g. personal hygiene, drugs, diet, smoking, exercise.
- Looking at health and safety issues.
- Considering how to treat living things and the environment with care and sensitivity.
- Looking at the ways in which the environment needs protection.
- Exploring why they need to look after the environment.
- Exploring the part played by science in civilisation.
- Investigation in groups, sharing expertise and skills.
- Science as a co-operative activity requiring communication and interaction.

Cultural

- Recognising similarity and differences between themselves and other pupils.
- Becoming aware that scientific discovery is worldwide and not a 'western' phenomena.
- Creation stories from different cultures alongside scientific stories.
- Scientific development in relation to others – water supplies, new varieties of flowers and food crops.

Training

Whole School

Oct 17 – Subject leader update to staff
Nov 17 – writing across the curriculum
Jun 18 – Valuing Vocabulary
Nov 18 – Enquiry Led Science
Mar 19 – STEM Training focus on Big Questions and independent investigating using BEST model
Sept 19 – PLAN assessment
Oct 19 – Data loggers
Oct 19 – Knowledge organisers
Oct 19 – Tier 3 Vocabulary
Oct 19 – Long term memory
Mar 2020 – Forces
Autumn 2019 – Electricity training
Summer 21 – subject leaders to teaching staff intro to Knowledge Organisers
Autumn 21 – Subject leads to teaching staff Knowledge Organisers and Science Enquiry
Autumn 21 – Audit and best practice following monitoring

Jan 22 – Assessment – TAPS enquiry
Nov 22 – Supported Planning to KS2 – Disciplinary Progression
Autumn Term – One to One Planning -KS1
Feb 23 – Enquiry Types
April 23- Enquiry Mapping, Misconceptions and Assessment
Summer 23 – One to one planning support disciplinary knowledge and curriculum coverage Year 1
September 23 – Disciplinary types and skills for front of books handed out.

Subject Leader

Feb 18 – Essex Primary Science conference
2019 – termly subject leader update
Spring 2019 – STEM facilitator training course
18-19 Thinking, talking, doing science trainer training
Autumn 2019 – STEM ambassador conference
Jan 2020 – Science leader update
Jan 2020 – ENTHUSE project update
Jan 20 – Supermarket science
Mar 2020- STEM Broad and Balanced Science Curriculum conference
Mar 2020 – STEM Facilitator

Jan 22 2 days STEM Centre, York developing the KS1 curriculum

Twice yearly science leader updates.

Autumn 23 – staff training on teaching / naming disciplinary skills and types (FORTHCOMING)	
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Enrichment
<ul style="list-style-type: none"> • Science week in a four yearly cycle. • External providers e.g. planetarium, raptor visit. • External visits, Museum of Zoology and Geology, forest school, Colchester Zoo, Boydells Farm, Wicken Fen, Sealife Centre, Bempton Cliffs, York Museum, RAF Hendon. • School environment including Wildlife garden. • Big Bang Fair. Annual. • Visiting scientist parents. • FlyTrap project with Wellcome Trust scientists as part of the Darwin Tree of Life project – Year 5 • Science Week 2023 Summer •