



PSQM-Portfolio

2023



Mary Tavy and Brentor Primary School

Small, village school in the heart on Dartmoor



Science Subject Leadership

S.L A. There is a clear vision for science, created and implemented by teachers and children, through principles for teaching and learning.

Pre-PSQM

During PSQM

Impact

I need to create the progression documents to match out new curriculum

The curriculum progression mapped by the trust lead did not match our progression, which meant children would have missed vital units of learning before moving into KS3.

The curriculum progression was adapted to suit the needs of the current cohorts. We merged the new curriculum with the NC- this way we addressed all the gaps in knowledge and skills.

The teachers are starting to feel more confident and reassured that the National Curriculum is covered and that the children will have the right knowledge and skills. The modified progression in learning which we are implementing, ensures that the children are not cognitively overwhelmed, and the knowledge and skills are truly embedded in their long-term memory.

Key Stage 1 – Seasons and weather		
Knowledge	Know How	Key Vocabulary
Observe changes across the four seasons Observe and describe weather associated with the seasons and how day length varies. Understand how seasonal changes affect flora and fauna	Children should observe and talk about changes in the weather and the seasons. Children should conduct seasonal research, such as collecting rain fall data / wind direction. Note: Children should be warned that it is not safe to look directly at the Sun, even when wearing dark glasses. Children might work scientifically by making tables and charts about the weather, and making displays of what happens in the world around them, including day length, as the seasons change.	year season spring summer autumn winter sunny cloudy windy dry
Big Ideas: If it is asking you to describe then you need the vocabulary to describe it. Eg if it is windy then you need to understand what wind is.		temperature climate
Key Stage 1 – Materials		
Knowledge	Know How	Key Vocabulary
Distinguish between an object and the material from which it is made Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock	Children should explore, name, discuss and raise and answer questions about everyday materials so that they become familiar with the names of materials and properties. Children should explore and experiment with a wide variety of materials, not only those listed in the programme of study. Children might work scientifically by performing simple tests to explore questions, for example: "What is the best material for an umbrella? ... for lining a dog basket? ... for curtains?" ... for a bookshelf? ... for a gymnast's leotard?"	hard/soft scratch/tear shiny/dull rough/smooth hardy/not hardy waterproof/not waterproof absorbent/not absorbent opaque/transparent leak paper fabric elastic (noun) foil
Compare and group together a variety of everyday materials on the basis of their simple physical properties.		
Big Ideas: Everything is made out of something and there is a variety of different materials		

Lower Key Stage 2 – Raw and synthetic materials		
Knowledge	Know How	Key Vocabulary
Children understand the differences in raw and synthetic materials Children understand the link between raw and synthetic materials and how materials are made	Children should build a more systematic understanding of materials by exploring and comparing the properties of a broad range of materials. They should find out about how chemists create new materials, for example, Synthetic Stone, who invented the glue for sticky notes or Ruth Benzoin, who invented acrylic hair dyes. Children should explore how materials are made and the importance of recycling materials on the environment. Children might work scientifically by carrying out tests to answer questions, for example: "Which material would be the most effective for making a swim-jacket, for wrapping or crepe to stop it melting, or for making the food container?" They might compare materials in order to make a search in a list. They could observe and compare the changes that take place, for example, when burning different materials in a fuming bottle or when they might observe and discuss how chemical changes have an impact on our lives, for example, cooking, and discuss the creative use of new materials such as polymers, super-sticks and super materials.	properties of different materials hardness, flexibility, permeability, conductivity chemical and thermal stability absorbent opaque transparent leak waterproof hardy soft brittle flexible strong weak brittle ductile malleable brittle ductile malleable brittle ductile malleable
Big Ideas: Need to know the difference between a mixture and a solution and how to separate them. Changes can be either reversible or irreversible.		
Upper Key Stage 2 – Energy		
Knowledge	Know How	Key Vocabulary
Children understand how energy is stored Children understand how energy is transferred Children understand how energy is used efficiently Children understand how energy is used to power devices Children understand how time, speed and distance relate Children understand kinetic energy	Children should explore energy use and transfer Children should explore how energy is used to power human's lives and how efficiency is achieved Children should have opportunity to conduct experiments into time, speed and distance. Children should explore how energy is used to power devices.	Efficient Power Kinetic Energy Potential Gravitational Chemical Elastic Heat



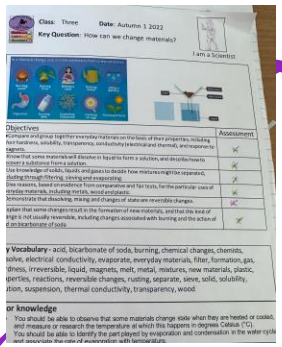
Mary Tavy and Brentor Primary School – Science Curriculum overview 2022 /2023

Year	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 2022-2023	Class 1 Light (DS 13 Light)	Human Lifestyle (DS 12 Animals including humans)	Space (DS 15 Earth & Space)	Changing materials (DS 11 & 12 Everyday materials)	Habitats (DS 12 Living things and their habitats)	Mixing and making (DS 14 States of matter & 15 Properties and changes to materials)
Year 2022-2023	Class 2 Phases of matter (DS 14 States of matter)	Rock Cycle (DS 14 Rocks)	Ecosystems (DS 13 Living things & their habitats, 14 Animals, including humans)	Space (DS 15 Earth & Space)	Raw and synthetic materials (DS 11)	Anatomy (DS 14 Animals, including humans)
Year 2022-2023	Class 3 Particles and Chemical Reactions (DS 14)	Electrical Circuits (DS 14 Electricity, 16 Electricity)	Magnets (DS 13 Forces and magnets)	Energy (DS 13 Properties and changes of materials)	Cells (DS 14 Animals including humans)	Humans and animals over time (DS 14 Evolution and inheritance)

Mary Tavy and Brentor Primary School – Science Curriculum overview 2022/2024

Year	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 2023-2024	Class 1 Materials (DS 11 Everyday materials)	Seasons and weather (DS 13 Seasons and weather)	Sound (DS 14 with DS 15 animals including humans & 14 sound)	Building things (DS 14 Use of everyday materials)	Plants (DS 15 plants)	Animals (DS 14 Living things including humans)
Year 2023-2024	Class 2 Practical skills (DS 11)	Evolution (DS 14 Animals including humans)	Sound (DS 14 with DS 15 animals including humans & 14 sound)	Adaptations (DS 14 with DS 15 animals including humans & 14 sound)	Plants (DS 15)	Ecosystems
Year 2023-2024	Class 3 Separating Mixtures (DS 11 Properties and changes of materials)	Raw and Synthetic (DS 14 Animals including humans)	Sound (DS 14 with DS 15 animals including humans & 14 sound)	Adaptations (DS 14 with DS 15 animals including humans & 14 sound)	Plants (DS 15)	Ecosystems

Work will continue to ensure the 2-year rolling program will address all issues. This will ensure a fair and equitable learning provision for all pupils and address the real concerns teachers have regarding the progression and coverage. To be able to achieve this, the concerns have been raised with the trust and the science lead across the trust.



Progression of Skills Document - KS2

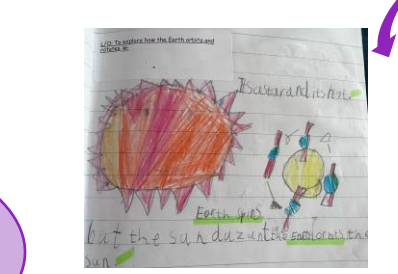
Class 2	Year 2	Year 3	Year 4	Year 5	Year 6
Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock					
Compare and group together a variety of everyday materials on the basis of their simple physical properties					
Children should explore, name, discuss and raise and answer questions about everyday materials so that they become familiar with the names of materials and properties					
Children should explore and experiment with a wide variety of materials, not only those listed in the programme of study					
Children might work scientifically by performing simple tests to explore questions, for example: "What is the best material for an umbrella? ... for lining a dog basket? ... for curtains?" ... for a bookshelf? ... for a gymnast's leotard?"					



The progression of skills is in a continuous development to match the knowledge progression. Having a clear progression reduces the discrepancies in teaching and learning and supports teachers to ensure quality first teaching. We strive to embed the notion that every child is a scientist.

Staff voice
"I don't feel confident teaching Energy, which is a KS3 unit, before my pupils have a solid knowledge of Light-a NC unit."

Staff voice
"I have real concerns regarding the progression, although my children enjoyed space and light it seemed a little out of their reach when teaching it. I'm also concerned we do not cover the NC fully."

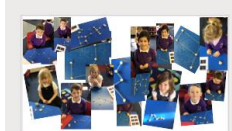
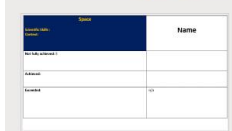
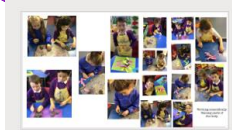


The children are exposed to an ambitious curriculum however, to ensure their smooth transition in each year group and KS3 the curriculum needs to be adapted. The children are enjoying learning, they remember the facts and are always very keen to share their knowledge.

Headteacher and other external stakeholders, such as governors, trust SLT and improvement officers can easily track and monitor the progression of Working Scientifically. The teachers' workload and tracking has reduced.

The TAPS assessment for Light in KS1 was adapted from the Y3 Taps, making it accessible to reception, year 1 and year 2 children by reducing the vocabulary and by scribing the recording as pupil voice. The children developed a secure understanding of key concepts because they have access to first hand experiences. It enables them to do and remember more as well as express scientific opinions. 'No light passes through this because it's opaque-child A'

Working scientifically is assessed using the TAPS materials. During staff meetings we discuss and adapt the materials to suit our curriculum which does not follow the NC progression. The tracking is done through a power point document where the teachers send in photo evidence, pupil voice and their final assessment judgement.



Science Subject Leadership

Pre-PSQM

During PSQM

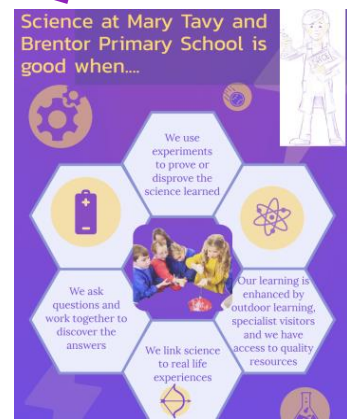
Impact

S.L.A. There is a clear vision for science, created and implemented by teachers and children, through principles for teaching and learning.

Discuss and agree on some core Science Principles relevant to our school.

We started by creating a pupil voice questionnaire to be able to consider the children's ideas and suggestions in science teaching and learning. The questionnaire will be revisited in the summer term.

Implementing a knowledge rich curriculum was at the expense of working scientifically. The children have expressed their views with regards science teaching and have requested more hands-on learning.



Bobby was in the space role play area with two of his peers. Bobby 'we're going to the moon, quick get in 5,4,3,2,1 blast off. It's going to take us a year to get there'. Miss valence explained that it only normally takes 3 days to reach the moon. Bobby 'quick lets go, you can be Buzz (points to peer), I'm Neil Armstrong, I have to set foot first on the moon and you can be the man in the spaceship (points to another peer). You can be the first women in space, Miss valence what was she called?' (Points to another peer). Miss valence explained that she was called valentina Tereshkova. 'Yeah you can be her, quick everyone crouch down, ready Pow Bang ahh, we are here that took us a long time! Be careful when you open the door, we don't know what's on the moon'.

Sink or Float
KS 1 materials experiments: asking question and working together.

EYFS child using science knowledge and understanding during Get Busy time in continuous provision.



Google Classroom- Science Principles shared with pupils and accessible for parents.

Science Questionnaire

How could your teachers improve science? 44 responses

Pupil Voice

more interesting work
DOING MORE EXPERIMENTS!!!
more experiments
itk
making more experiments on laptops
do more experiments
to do some more experiment
do more experaments
Make it more fun because I don't really like it

What would you like to do more of? 46 responses

experiments
experemts
experiment
I would like to do more experiments.
computer work!
electricity
creating more robots
experiment
experoments

What's been your favourite part of science this year? 48 responses

Doing experiments about physical changes and chemical changes.
chemicle changes
My favourite part was going on school trips.
electricity because it is fun
my favourite part of science this year is making electrical circuits
electricity
making a circuit
chemical and physical changes
chemical changes

Pupil voice clearly showing the positives and negatives from the children's perspective.

We analysed the Ofsted Science reviews and pupil voices and designed the school's Science Principles. Each book will have a clear visual of our Key Principles. The Principles are also clearly available on our school displays, website and it was shared with parents via our online platform-Google Classroom. By involving the children, it boosted engagement in science and raised the profile of science within school. The pupils commence to see themselves as young scientists. Having a clear vision, designed in a collaborative way, ensures an ambitious, coordinated approach to teaching science within our school and preparing children for KS3, as well as holding everyone accountable.

	Monday	Tuesday	Wednesday	Thursday	Friday
8:45	Values Assembly Phonics / Spelling	Phonics / Spelling	Phonics / Spelling	Singing Assembly Phonics / Spelling	Celebration Assembly
9:00	Maths / Cent prov	Maths / Cent prov	Maths / Cent prov	Maths / Cent prov	Maths / Cent prov
9:30	Maths	Maths	Maths	Maths	Maths
10:30	French	Newsround	Newsround	Newsround	Newsround
10:45	Monday	Tuesday	Wednesday	Thursday	Friday
11:00	Maths	Maths	Maths	Maths	Maths
11:30	Spelling	Spelling	Spelling	Spelling	Spelling
12:15	English	English	English	English	English
12:45	Reading	Reading	Reading	Reading	Reading
1:15	English	English	English	English	English
1:45	Lunch	Lunch	Lunch	Lunch	Lunch
2:15	PE (B&B)	PE (B&B)	PE (B&B)	PE (B&B)	PE (B&B)
2:45	PE (B&B)	PE (B&B)	PE (B&B)	PE (B&B)	PE (B&B)
3:15	PE (B&B)	PE (B&B)	PE (B&B)	PE (B&B)	PE (B&B)
3:45	PE (B&B)	PE (B&B)	PE (B&B)	PE (B&B)	PE (B&B)
4:15	PE (B&B)	PE (B&B)	PE (B&B)	PE (B&B)	PE (B&B)

To maintain the high profile of science and to recognise it as a core subject, science is taught during the morning across the school.

Displays share the schools' vision and principles and demonstrate that science is getting an increased profile.

I am a Scientist

Class 1: Changing Materials

Class 2: States of Matter

Class 3: Energy and Light

Key Vocabulary, Sticky Knowledge, Big Questions, Can you name a new material?

Photographs, children's learning journey, sticky knowledge, the key principles together with big questions are proudly displayed within school, supporting learners to remember more and have discussions as scientists.

Science Subject Leadership

Pre-PSQM

During PSQM

Impact

S.L.B. There is a clear vision for science, created and implemented by teachers and children, through principles for teaching and learning.

Regularly engagement with science professional development activity.

Prior to our PSQM journey we did not have a scheduled timetable for personal CPD, staff CPD or release time for monitoring and subject leadership.

Through the year, the SL CPD and release time was prioritised.

I was able to support teachers build the confidence to change planning, adapt teaching methods and move units around to ensure a clear progression is achieved. This ensured that the children move through the school and KS3 without any gaps in their knowledge and skills. Providing teachers tools for upskilling, enhanced the science lesson and stimulated pupils' engagement.

21/03/23	Staff CPD Collaborative planning	SL, teachers, Headteacher	their learning within real life experiences. Planning session for upcoming science unit. As a team we adapted and changed certain units, knowledge and skills to match the NC and children's needs. All staff felt better equipped and confident in teaching the adapted units.	Changed the overviews and signposted staff to different materials to be used within lesson: <i>eggplants</i> , stem resources.
----------	----------------------------------	---------------------------	---	--

Spring 2	Summer 1	Summer 2
Changing materials (E5) Y1 A2 (Everyday materials)	Habitats (E5) Y2 (Using things and their habitats)	Mixing and making (E5) Y3 (Properties and changes of materials)
Space (E4) (E5) Y5 Earth & Space	Raw and synthetic materials (E4) (E5) Y6 Properties and changes to materials)	Anatomy (E4) (E5) Y6 Animals, including humans)
Energy	Cells (E5) Y6 Animals including humans)	Humans and animals over time (E5) Y6 Evolution and inheritance)

Teachers worries and concerns were listened to and addressed. We changed and adapted certain units to fit with the current cohort's gaps and to align with the NC. For example, the y5/6 unit on Energy was combined with Light.

Staff voice
"Having clear expectation for science within each class is a great reminder. We can see the consistency across the school now."

Pupil voice
"I like everything about science. It is hard, the vocabulary is tricky, but it is interesting. If you know the knowledge you can find many things out through experiments."

Pupil voice
"I like it when I get to find things out that I don't know."

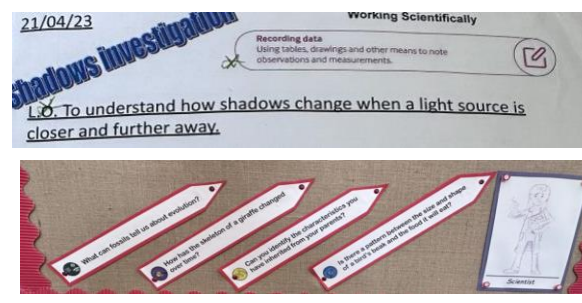
CPD have been signposted for the teachers and support staff. Some sessions were carried out as INSET twilights instead of staff meetings. The impact of regular CPD is visible in the variety of approaches in teaching and the pupils' engagement with science.

- Tuesday 8th November - Five types of enquiry knowledge, application and suggestions to take further - led by Sally Fulford (PSQM Hub Leader)
- Wednesday 16th November - Child-led enquiry - led by Ed Walsh (Senior Regional Hub Leader)
- Tuesday 22nd November - Matching teaching strategies to learning needs- led by Ed Walsh (Senior Regional Hub Leader)
- Tuesday 6th December - Assessment practices in science (to include TAPS and PLAN) - led by Sally Fulford (PSQM Hub Leader)
- Tuesday 13th December - Royal Society Chemistry workshop on working scientifically - led by Kate Whetter (RSC)

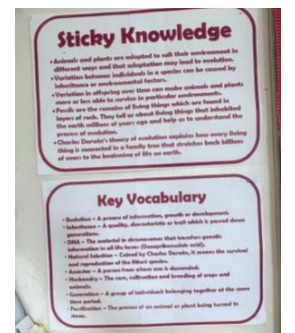
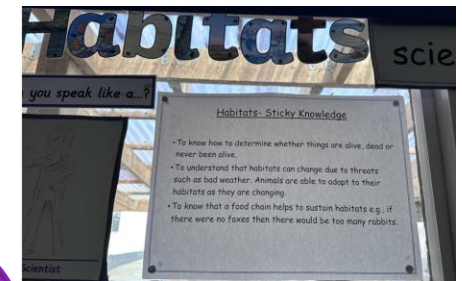
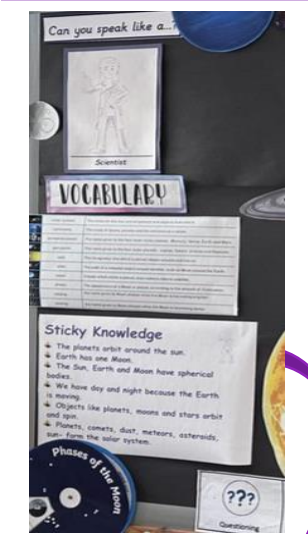
06/11/22	The five types of enquiries	SL	Deepened my understanding on the different enquiry types, offered a clear vision on how we could start using them in school and how to introduce them to children.	Created the display symbols and suggested a 20 min introduction during our next staff meeting.
11/11/22	Working Scientifically	SL	I have signposted and booked subject knowledge CPD for upcoming unit on Space for KS3 and L5. The course will provide the appropriate level of subject knowledge and depth in teaching a new unit in KS3 and L5.	It should help me and my colleague to better understand a unit that has been originally taught on UKS.
07/12/22	SL, SLT, SLE mtg. School assessment for science	All staff including support staff	Feedback from the assessment course and used the Mary Muffitt research into assessment and using retrieval quizzes. Staff had a clear idea of the range of strategies and processes for formative, summative and statutory assessment to be used.	Signposted staff and purchased a Mary Muffitt book with suggestions on retrieval practice.
13/12/22	Royal Society Chemistry workshop on working scientifically	SL	The course offered clear guidance and ideas on how to use the RSE website. Provided with new ideas on how to review working scientifically within school.	Feedback to wider staff. Signed up to KS3 website and suggested ideas on how the resources could be used.
20/01/23	Staff mtg. Science	SL, all staff	Brief meeting ensuring everyone is starting to embed the common principles and that everyone has a shared understanding and ownership of what makes good science at our school. Children and families to have clear guidance about the relevance of science in school and at home.	Share principles to be displayed on the website and shared with parents and with governors. When monitoring/learning walks take place, to look for evidence of principles in action.
20/01/23	LC Outings, Introducing Science Capital	SL	Self-directed CPD- provided ideas and suggestions on how to enhance the children's cultural capital.	Focus on careers during science week. Introduce careers and expert videos within lessons.
20/01/23	Primary Science Capital Teaching Approaches	SL	Self-directed CPD- enhanced the understanding of what science capital is and what the barriers are for our school.	Shared with teachers via TEAMS science folder for self-read. Suggested staff meeting.
28/02/23	PSQM session - Developing working scientifically	SL, teachers, headteacher	Introduced and shared the working scientifically symbols. Shared the vision of working scientifically tracking and assessment and discussed how we can incorporate TAPS as part of our assessment policy. It will raise the profile of science by applying the science knowledge learned and it will deepen the children's understanding of what it is to be a scientist.	Create the working scientifically tracking system. Print scientific symbols and have them displayed on working walls. Review in the summer term.

Following my ongoing CPD during the PSQM sessions and tasks, professional conversations about science and curriculum development started to develop the MTB vision for science.

The CPD sessions and informal professional dialogue allowed us to develop a consistent approach to science teaching, start enhancing children's cultural capital and creating stronger links with our parental body. The profile of science started to increase due to staff confidence in a approaching the science teaching.



Consistent teaching approaches and displays are visible through the school and books. The children have access to the same resources only adapted to suit their class. Each science dedicated staff meeting the tier 2 vocabulary, the sticky knowledge and big questions are discussed, analysed and agreed upon. This ensures that each child is exposed to the same quality of resources, has the right scaffolds in place and is challenged accordingly.



Books viewed show teachers have high expectations and pupils take pride in their work. Pupils talk well about regular opportunities for retrieval and would welcome more opportunities to interleave their prior learning more to make more meaningful connections to previous learning and help them consolidate their knowledge over time. Pupils were well engaged and demonstrated good working habits when working independently. Teachers show good knowledge of how to meet the needs of the mixed age classes. Teachers had planned well according to their prior learning and supported pupils with rotation and questioning. A learning walk tool place in each class. All pupils spoken with were clear on the learning they were doing.

Science Subject Leadership

Pre-PSQM

During PSQM

Impact

S.L.C. monitoring and improvement cycle that informs development in science

I need to ensure we have regular learning walks, book scrutiny, pupil voice and planning sessions.

At the start of the year we agreed to implement a monitoring calendar. Regular learning walks have been implemented but we had no actions in place. Pupil voice was introduced at the start of the year.

SL and head meeting resulted in Science being recognised as a core subject and timetabled during a morning. SL will be released termly for Learning walks.

Science is taught on a Friday morning across the school.

	Monday	Tuesday	Wednesday	Thursday	Friday
8:45 - 9:00	Whole School Assembly	Response to marking TTDS	Response to marking TTDS	Singing Assembly	Response to marking 1:1 readers
9:00-9:20	Spelling	SPAG	Spelling	Spelling	Whole School Celebration Assembly
9:20-10:20	Maths	Maths	Maths	Maths	Arithmetic (30 mins)
10:30 - 10:45	Class Reader	Newsround	Newsround	Class reader	Science 10:00
10:45-11:00	Break time	Break time	Break time	Break time	Break time
11:00 - 11:30	Reading	Reading	Reading	Reading	Science
11:30-12:30	English	English	English	English	

During learning walks and through pupil and staff voice, it was evident that a curriculum scrutiny had to happen. SL and head agreed to have a greater focus on the skills as well as the knowledge rich curriculum.



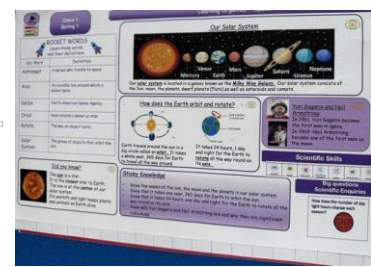
Lesson Observed by:		General Lesson Information (e.g. L.O., additional adults, SEND, EAL, FSM children)
Teacher:	K Ascot	To observe the engagement of children in science when using Explority (introduced last academic year).
Class/Year group:	Y5-6	
Subject:	Science	
Date & Time:	25.11.22	
Notes:		
<ul style="list-style-type: none"> Explority used as a hook for the adaptation lesson. Children engaged and shocked by the barnacle dive video. Children keen to talk about what they have seen. Teacher allowed free discussion. Teacher intervened and prompted with effective questioning but allowed the children to express their views and understanding. Good gearing towards use of scientific vocabulary and knowledge from previous lessons. Pupil led discussions 		

The pupil voice is shared with staff and discussed in staff meetings. As a result, we adapt the curriculum to suit the needs of our children.

Pupil Information		Yes	No	Limited evidence
Total Number of Books Reviewed:	5			
Contextual Information (e.g. SEND, EAL, FSM, any other groups):	SEND-1			
Elements of Good Practice				
In the vast majority of cases, there is evidence of the following:				
Good breadth and depth of learning when the units being taught:				
Progress in children's knowledge (including building on prior knowledge):				
Progress in children's working scientifically skills:				
A variety of learning opportunities (e.g. group work, scientific enquires, enquiries, discussion etc.):				
Children recording their learning in a variety of ways:				
Good use of age-related subject-specific vocabulary:				
Use of questioning and critical thinking skills:				
Opportunities for cross-curricular work where appropriate:				
Outdoor learning opportunities where appropriate:				
Activities that provide a suitable level of challenge for all learners to make good progress (including those with SEND, EAL, FSM):				
Feedback from the teacher that addresses misconceptions and supports children to develop independence and make good progress:				
Strengths:				
Appropriate use of science vocabulary				
Great physical involvement of the children in life of a plant cycle				
Areas for Development:				
Scientific skills display				
Learning objective with the scientific skills clearly displayed and explained to the class.				

CPD for staff has been offered, part of the termly staff meeting, introducing the working scientifically and discussing how we can start familiarizing children with the scientific skills.

The teachers had the confidence to display and use the enquiry types and scientific skills, ensuring consistency across the school.



Majority of the children could talk about their skills as scientist during the summer term during their pupil voice sessions with LA advisors and Ofsted inspector in the role of school improvement officer.

Science lead gains a clear picture of the school and knows which teaching staff need further support. Science leader is confident that the CPD has an impact on the children's learning through the opinion and voice of the pupils.

The spring term pupil voice showed that the children are aware that they being taught science for more than one hour each week, showing the staff have managed to raise the profile of science and treat it as a core subject.

During the book scrutiny, in Spring we agreed to have the Science Principles displayed in the books.

Class 1,2,3 Book scrutiny-29 June 2023

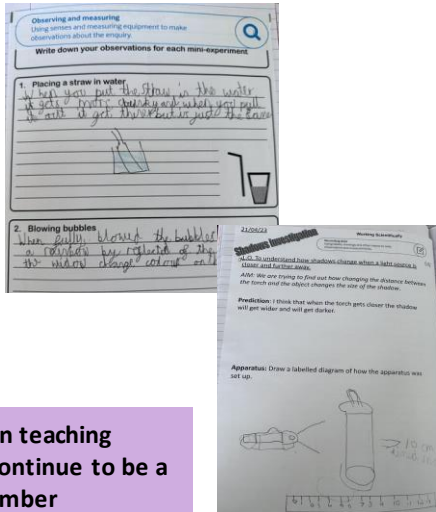
- Good coverage of the curriculum; all classes are following the long term plan.
- Science taught in a practical way and outdoors- photo evidence and pupil voice – EYFS and KS1 in particular
- Cover sheets including the teacher assessment, NC links and Vocabulary clearly displayed and used.
- Science principles displayed in most books-Y5/6 will need to ensure those are displayed and referred to.
- Some response to marking- probing/ stretching questioning occasionally used – mostly in KS2.
- Science is taught during a morning across the school.
- Evidence of Working scientifically displayed in books- photos and scientific experiments recording.
- Start of using the science enquiry symbols and skills
- End of unit Assessments are used and stored in a separate file.
- Learning organisers displayed and accessible to children.

Pupil voice-Autumn term

The children felt that there is a lot of writing involved in their science experiments.

Pupil Voice- Summer term

Pupils were more excited about their investigations as they only had to focus on one area of the investigation.



Book scrutiny and subject review during the summer term showed consistency in teaching across the school. Most targets have been achieved. Working scientifically will continue to be a focus in the new year and will be reviewed at the end of the autumn term-December

Science Teaching

T.A. Science staff meetings are timetabled regularly.

Pre-PSQM

During PSQM


Impact

We need to timetable and have regular staff meetings where Science is discussed and assessed.


In previous years we did not have a clear progression or an ongoing CPD approach to Science teaching and learning.

07/12/22	SL, SLT, 200 mg, School assessment for science	All staff including support staff	Feedback from the assessment course and used the Mary Myatt research into assessment and using retrieval quizzes. Staff had a clear idea of the range of strategies and processes for formative, summative and statutory assessment to be used.	Supported staff and purchased a Mary Myatt book with suggestions on retrieval practice.
13/12/22	13/12/22 Feedback for all 10/01/23	SL	The course offered clear guidance and ideas on how to use the RSE website. Provided with new ideas on how to develop working scientifically within school.	Feedback to wider staff. Signed up to Ed website and suggested ideas on how the resources could be used.
10/01/23	Staff mtg-Science	SL, all staff	Staff meeting ensuring everyone is starting to embed the common principles and that everyone has a shared understanding and ownership of what makes good science at our school. Children and families to have clear guidance about the relevance of science in school and at home.	Share principles to be displayed on the website and shared with parents and with governors. When monitoring/learning walks take place, to look for evidence of principles in action.
20/01/23	CPD Spotlight: Introducing Science Goals	SL	Self-directed CPD - provided ideas and suggestions on how to enhance the children's cultural capital.	Focus on careers during science week, introduce careers and expert videos within lessons. Shared with teachers via TEAMS science folder for self-read.
20/01/23	Primary Science Quality Standard approach meeting	SL	Self-directed CPD - enhanced the understanding of what science capital is and what the barriers are for our school.	Suggested staff meeting. Create the working scientifically tracking system. Print scientific symbols and have them displayed on working walks. Review in the summer term.
28/02/23	CPD Spotlight: Enhancing science lessons	SL, teachers, headteacher	Introduced and shared the working scientifically symbols. Shared the vision of working scientifically tracking and assessment and discussed how we can incorporate 'tags' as part of our assessment policy, it will raise the profile of science by applying the science knowledge learned and it will deepen the children's understanding of what it is to be a scientist.	
29/11/22	SL, SLT, 200 mg, Enquiry types CPD	All staff	Introduction of the enquiry symbols to all staff. Discussions about how to present them to children, display them in school. All staff made aware of how to start using the enquiries and how to promote them: eg within EYFS get busy time.	Clearly visible display within school.


Science is starting to be a regular focus during staff meeting, at least once half termly. Books are scrutinised, retrieval quizzes are assessed for their efficiency and important CPD is shared with the wider teaching staff. The main outcome of a regular dialogue is ensuring consistency in teaching approaches across the school, embedding the common principles and identifying gaps in learning or knowledge. We strive to promote depth in learning and reduce the misconception. The teachers have a clear understanding of the subject and can scaffold or provide the appropriate challenge.



Class 3 -STAFF
Group



Class 2
Group



Class 1
Group

Key Questions	How do we know?	Background
How do we know?	How do we know?	Background
How do we know?	How do we know?	Background

Online platform for shared access. SL, Headteacher or external partners can monitor planning and evidence.

Staff can regularly check planning and extra materials, such as Learning Organisers, vocabulary posters via our SharePoint files. The ease of access has enabled staff to collaborate, ask opinion and share work informally, especially during busy times when staff meetings cannot happen. This ensures staff are still supported and have access to the right documentations.

Regular staff meetings ensures a clear progression of knowledge and skills in happening across the school. The teachers have a solid understanding of the start points and end points of certain units. The children's skills are built upon and the recording process evolves through the school.

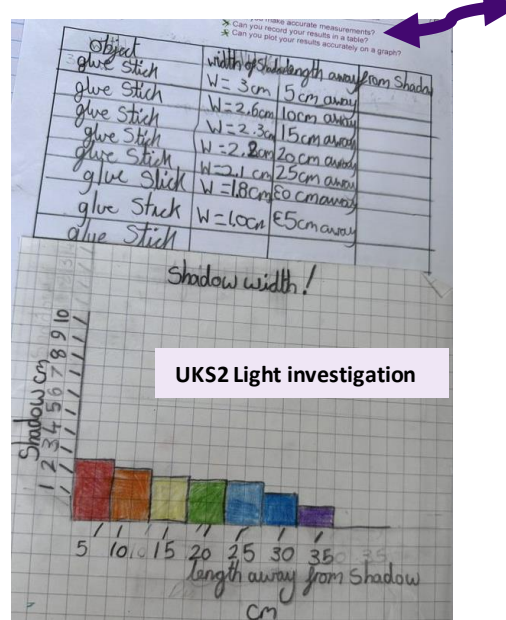
Staff voice
"Termly discussion where we address progression, especially with the new imposed curriculum by the trust, makes it clear what the children have covered previously and where I need to take them next."

Staff voice
"Trying to match the EYFS UW with our science units has reduced the stress in trying to plan 2 or 3 lots of lessons. Teaching in EYFS, Y1 and Y2 class has its challenges but science is starting to feel more fluid."

Staff voice
"The new ideas and being exposed to the most recent research have given me a clearer focus on how I can cover the units in an engaging way, bringing science to life with my class."

Staff mtg minutes

<p>PSQM status</p> <p>Teachers to bring science books to next staff mtg. Discussed the Science Principles-children are starting to become more familiar. Staff expressed an increase in science discussions and participation from pupils. Scientific experiments/enquiries are effective and lead on to extra findings and discussions.</p>	<p>Keep embedding the skills and enquiry types</p> <p>Support SEND to access LO's</p>
---	--



Assessment tools are shared, discussed and adapted, during staff meetings when necessary, through collaborative planning ensuring the coverage on the NC and a ambitious progression of tier 3 vocabulary.

Science Teaching

Pre-PSQM

During PSQM

Impact

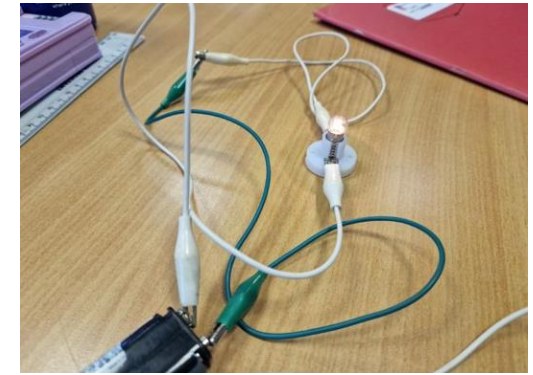
T B. A range of new teaching strategies for science has been introduced and evaluated in the last year.

I need to ensure that science resources are up-to-date, sufficient, well organised and compatible with the new curriculum

School resources were dated, broken and scattered throughout the school. Little or no care was shown towards the resources and knowing what we had and what we needed was difficult.

Once the progression was in place, we focused on having a resource audit and replenish, stock and updated the resources. Due to budget constraints the restocking happens gradually. Great emphasis was put this year on providing each class with rich texts to accompany the science teaching.

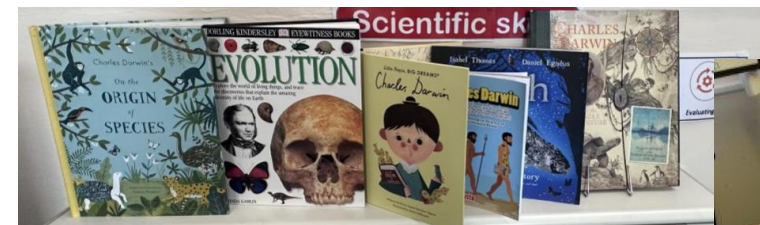
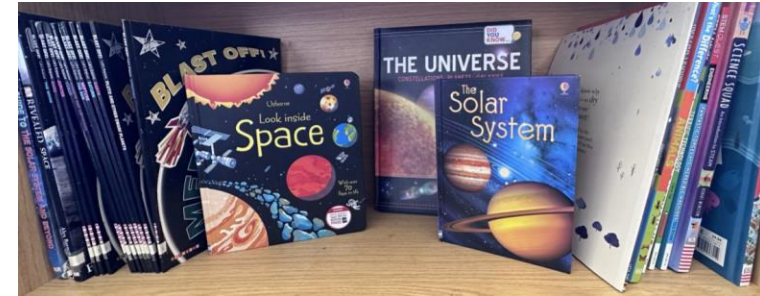
Children's experiences of primary science are enhanced by having a range of resources available. During working scientifically lessons, having the right equipment for experiments creates excitement, promotes curiosity and is helping us teachers instil the notion that every child is a scientist. Access to the right equipment fuels children's curiosity and their investigations led to a variety of interesting and diverse enquiries.



A variety of equipment used in school for practical work in line with CLEAPSS guidance. Currently it is stored in a central area, clearly labelled and checked periodically. We are hoping to introduce STEM ambassadors in the new academic year, to help with equipment.



Having a well-stocked, labelled and organised resources cupboard enables the teachers to prepare for lesson efficiently, reduce preparation time and have the confidence to use a range of equipment.



Y5 children during a light investigation. Using torches to determine the size of the shadows.
Year 3 and 4 children investigating rocks permeability and appearance.

The children are exposed to a variety of equipment and resources, which enhance their learning. They are more engaged and inquisitive. Using fiction and non-fiction texts develops their wider scientific understanding; the equipment used for scientific enquiries, magnifying glasses, kits, stop watches, rulers, torches, data loggers-help the children feel what it is to be a scientist become scientists themselves.

Pupil voice investigation experiments conversation

GD: "The whiteboard reflects the most ... as it's plastic"
PM: "I thought it would be the [laminated] bookmark, as it is shinier"
BD: "Light bounces better off a smooth surface"

Science Teaching

Pre-PSQM

During PSQM

Impact

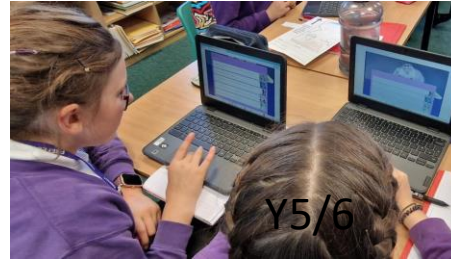
T.B. A range of new teaching strategies for science have been introduced and evaluated in the last year.

Ensuring a variety of approaches are used throughout the school to teach and promote science.

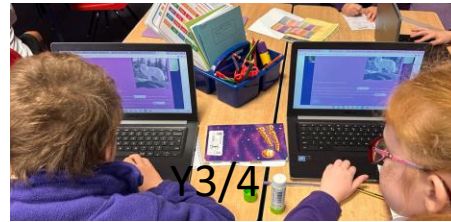


Teachers encourage independent, pair or group work, depending on the task and unit. Greater emphasis this year is the self-evaluating and presenting their work or findings.

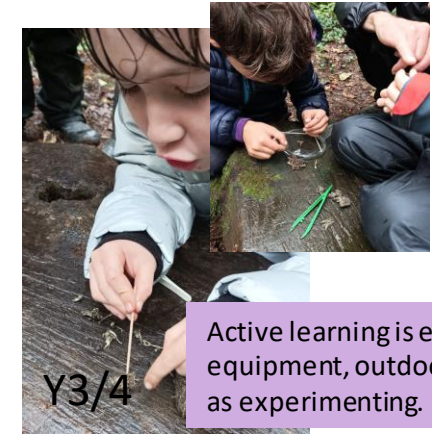
Children are empowered to think like a scientist and find ways of collaborating and sharing their ideas.



Low stake knowledge and vocabulary quizzes, using a digital platform have been introduced in ks2. They complement the teacher made retrieval quizzes used at the beginning of each session.



Introducing a digital platform for learning, has enabled the children to share their learning with their families. It also provides a quick, easy and non-pressured way for teachers to assess the knowledge being taught.



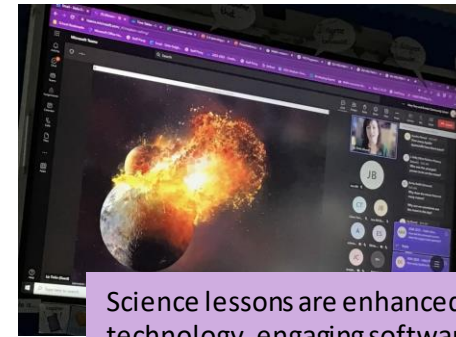
Active learning is encouraged using equipment, outdoor learning as well as experimenting.



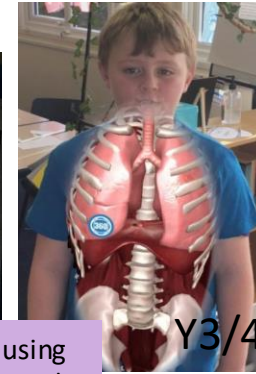
The greatest impact of active learners was noticeable among the SEND pupils. Teachers have noticed a higher level of engagement and understanding.

Pupil Voice
"We have to work as team in science. Somebody will know something and I might just have something to add."

Applying and promoting scientific discussions, has enabled teachers to easily assess and address misconceptions.



Science lessons are enhanced using technology, engaging software and expert talks, such as webinars.



Explorify is widely used across the school as a stimulus for discussion, assessment or hook.



Books, software, online and in person workshops are used in science lessons. This ensures that the children are appropriately supported or challenged. The different strategies are widely used to support children engage with science.



Promoting science based careers, has started to enlarge the children's understanding of how we can apply science and broaden their cultural capital.

During the year we had a greater emphasis on what is a scientist, what they do and what careers use science. The drive has been to promote the science-based careers.

Children have access to a range of fiction and non-fiction books linked to each of our units. The books are used for reading for pleasure, research or during lesson time to support with various activities.

Science Teaching

Pre-PSQM

During PSQM

Impact

T.C. Children across the school experience science taught outdoors.

Children across the school will experience science taught outdoors.

We began the academic year by introducing Muddy Monday to reception children for them to enhance their understanding of the world provision. We used our school field for the Monday explorations. In Autumn 2 we have introduced it to KS1 and KS2 with great success.

Muddy Monday explorations



Pupil Voice

"I love learning outside. I like going to the field and I don't care if it rains. I like mud. Learning outside is much more fun than writing."

	Monday	Tuesday	Wednesday	Thursday	Friday
8:45	Whole School Assembly Phonics / Spelling	Phonics / Spelling	Phonics / Spelling	Singing Assembly Phonics / Spelling	Celebration Assembly
9:20	Maths / Cont prov	Maths / Cont prov	Maths / Cont prov	Maths / Cont prov	Science / LW
10:30	Break	Assembly	Break	Break	Break
10:45	Reading Practice	Reading Practice	Reading Practice	Reading Practice	Science / LW
11:15	English / Cont prov	English / Cont prov	English / Cont prov	English / Cont prov	Handwriting
12:15	Lunch time	Lunch time	Lunch time	Lunch time	Lunch time
12:45	CK/KH Muddy Monday (SW)	Handwriting (SW)	Handwriting (SW)	Handwriting (SW)	Computing
13:15	Forest School	Geography / LW	Geography / LW	RE / LW (CS)	Music (SAD) (CS)
14:15	Forest School	PE / PD	PE / PD	PE / PD	PE / PD

	Monday	Tuesday	Wednesday	Thursday	Friday
8:45	Whole School Assembly	SPAG	Spelling	Singing Assembly	Handwriting
9:20	Maths	Maths	Maths	Maths	Science
10:30	Break time	Break time	Break time	Break time	Break time
10:45	Reading	Reading	Reading	Reading	Science
11:15	English	English	English	English	SPAG
12:15	Lunch Time	Lunch Time	Lunch Time	Lunch Time	Lunch Time
12:45	R.E	Geography	French	PE	DT
13:15	Music	Computing	Forest School	PE	Music

	Monday	Tuesday	Wednesday	Thursday	Friday
8:45-9:00	Values Assembly	Maths	Handwriting/Spelling	Singing Assembly	Celebration Assembly
9:00-9:15	Maths	Maths	Maths	Maths	Science
10:30-10:45	Break	Break	Break	Break	Break
10:45-11:15	Reading	Reading	Reading	Reading	Science
11:15-11:30	English	English	English	English	News/DT/PE
12:15-12:30	Lunch	Lunch	Lunch	Lunch	Lunch
12:30-12:45	Geography	PE (BSW)	Computing	PE	RE
13:00-13:15	PE	French	DT	Forest School	Music
13:15-13:30	PE	PE	PE	PE	PE

The science learning was enhanced by the introduction of Forest School as part of our regular timetable. Currently we map the forest school provision to match our outdoor teaching, providing the children with a way of exploring their knowledge in real life situations: pond dipping, nature/bird audit, botanical drawings. The children's engagement has increased, especially for SEND children. Their experience has been elevated to something they can relate to. Teachers feel less pressure in terms of recording in books and find the activities to be rewarding and reduce the common boredom behaviour.



TAPS assessment carried out outdoors during LKS2 unit of Raw and Synthetic materials. The children were encouraged to find a variety of materials and find various ways of sorting and classifying them. No input was given on HOW to classify. The impact was greatly noticeable on the children's interactions and scientific thinking - higher hierarchy thinking was achieved and connections between common knowledge and lessons learnt within the classroom.
Pupil J 'this was a raw material but now it is not. It changed by humans - piece of pottery'.
Pupil T 'I think this can be both raw and synthetic. It is rubber so we don't know if it's from the plant or made by people.'



Our outdoor learning is celebrated within school on our board. The children are proud to see their work and pictures displayed and are keen to discuss about their experience with any visitors or peers. They are now making more links with the skills taught across the curriculum. For example they understand that as artists they will require skills transferable to science - botanical drawing, as engineers they craft, design and test, much as testing in science.

Our outdoor learning is shared and celebrated with parents via Parents Newsletters. The parental feedback is incredibly positive, and the engagement has increased.

Parent feedback "My child cannot stop talking about the science at field. We had to create tables and analyse materials at home."



L.A. Children across the school use the full range of enquiry types to answer scientific questions.

Children across the school to be more confident in choosing the correct enquiry type.

As a school we have started to implement and gradually embed the various scientific skills as well as the enquiry types. Staff were confused to begging with. We organised a staff meeting where we looked in more detail what each of the enquiry types represents and how they can be used across our curriculum.

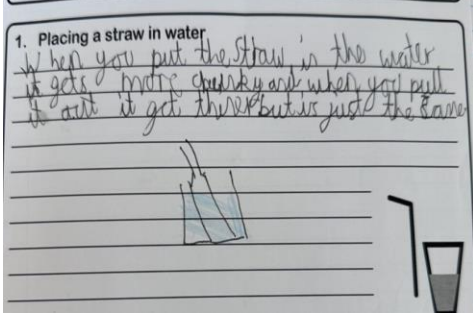


The enquiry is designed as a class, the children use the display and knowledge learn to inform their decision on what they need to find out or test. They develop their skills of working collaboratively, they can recognise the skills needed more quickly and their scientific knowledge is depended by accidental discoveries.

Researching, analysing and recording information from a variety of sources while working collaboratively.

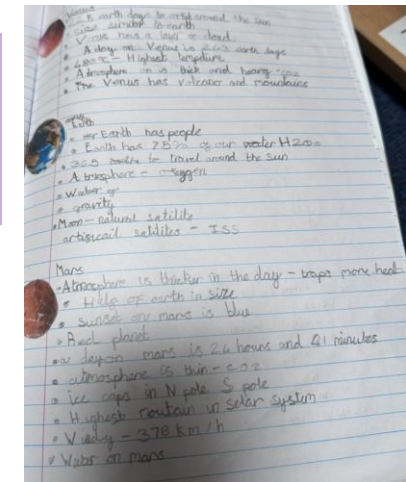
Working Scientifically was introduced by using a proforma, slightly different for ks1 and ks2. We used the proformas we designed, for ease and to introduce the children to the various steps a scientist takes to design the experiment.

Observing and measuring
Using senses and measuring equipment to make observations about the enquiry.
Write down your observations for each mini-experiment

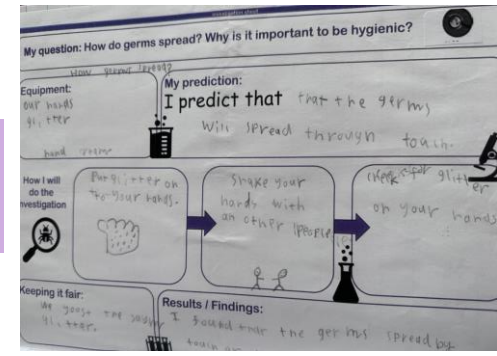
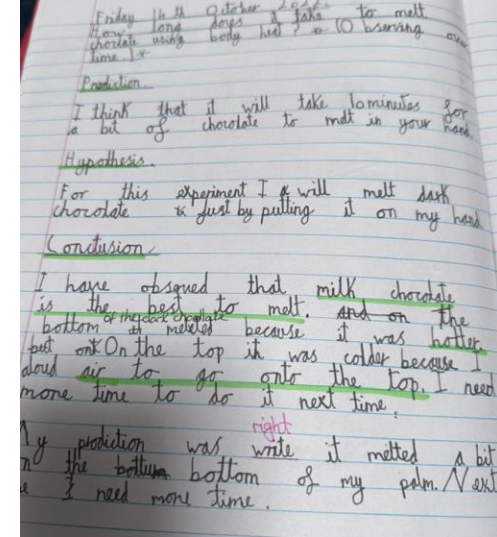


Children are presented with a range of Big questions, based on the 5 types of enquiries. We aim to answer these questions as we move along a unit of work.

Children thrive when they are given the status of the lead scientist and tasked with finding a solution/answer/reason to one of the Big Questions based on the enquiry types. Their enjoyment of science has raised, and they are better equipped now in choosing the right enquiry type for their own scientific questions.



Work is presented in a variety of ways now that there is a solid understanding of a scientist's thinking.



Results:

Distance from the torch (cm)	Width of shadow (cm)
10 cm	11.5 cm
20 cm	10 cm
30 cm	9.5 cm
40 cm	9 cm

Assessment Focus:
 Can you make accurate measurements?
 Can you record your results in a table?
 Can you plot your results accurately on a graph?



We have the enquiry types displayed on our walls. The children decide which type of enquiry they will have when they are designing their own experiment. We strive to become secure enough to move towards a child led enquiry approach.



- In our class, are omnivores taller than vegetarians?
- What are the names for all the organs involved in the digestive system?
- Teeth. Can we organise them into groups?

Science Learning

Pre-PSQM

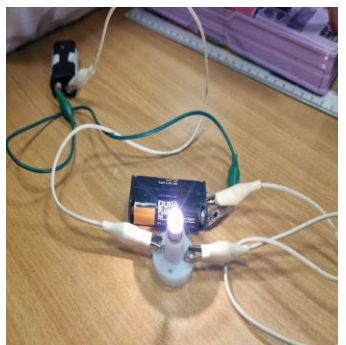
During PSQM

Impact

L.B. Teachers regularly use a range of assessment strategies to inform learning in science.

Teachers regularly use a range of assessment strategies to inform learning in science.

As a school we have decided that we need to assess the children's disciplinary knowledge and their substantive knowledge in a variety of ways.



Providing the children opportunities of scientific exploration, leads to excitement and desire to further explore at home. Children produced their own designs, models and research and presented their work during Science Week. **The children's interest and excitement in science has increased.** The teachers use ongoing assessment for learning with every opportunity. The teachers have found that assessments can happen anytime and having a rich, deeper conversation about a child's project, research or interest offers a much better picture of their scientific understanding.

The substantive knowledge is assessed as an end of unit quiz. The children are exposed to a variety of questions, ranging from multiple choice to drawing, a notating and explain. Self-marking opportunities has been successful by giving children ownership over their work, has increased attainment and decreased test pressures on the children. The teachers use the assessments questions as future recap and retrieval quizzes for the next taught units. It provides teachers with a quick tool of assessing the knowledge gaps.

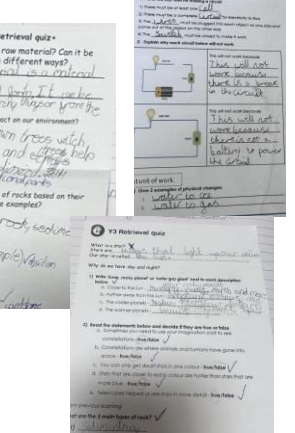
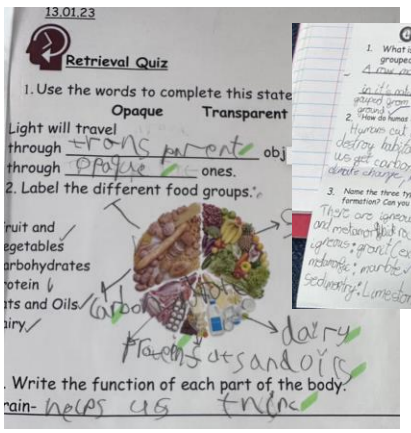
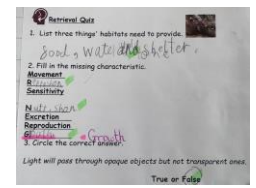


States of Matter		Name
Scientific Skills - Making observations Title: How quickly can you melt the chocolate with your own body heat?		
Not fully achieved:		Riley P, Ruby, Iona
Achieved: The children make systematic and careful observations. They use a range of equipment for measuring length, time, temperature and capacity.		
Exceeded:		n/a

For disciplinary knowledge we started following the TAPS assessments and using the TAPS pyramid to inform our judgements. We try and match the TAPS assessments with our curriculum, and we adapt where it is needed. These engaging resources provide children with an exploratory platform of awe and wonder. The children showcase their working scientifically skills in a fun, non-pressured way often, leading to new discoveries and enquiries. For example, analysing a variety of rocks and looking closely at their different properties, designing a closed or parallel circuit or exploring how light travels through materials that are opaque or translucent.

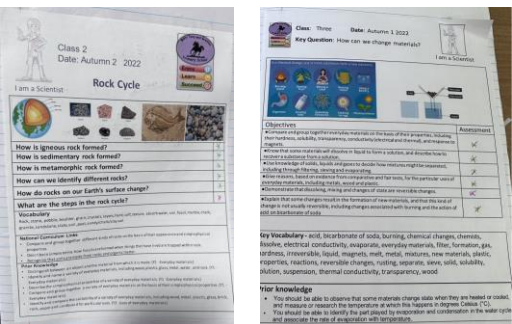


We assess and track the working scientifically with TAPS and we monitor progression via an online portfolio where we record pupil voice and who's WTS or EXP. Teachers find this type of tracking less hours and time saving, being able to focus more on the interactions with the children, while probing to check their scientific understanding.



Retrieval Quizzes are the core of our assessment strategy. Teachers have found that retrieval quizzes offer the opportunity of quick assessment and revising prior knowledge. It has enabled children to embed their learning and start to make connections to the wider world.

We are exploring new ways of assessing knowledge, such as using technology to reduce the process of writing and focusing more on the scientific aspect. We are trialing Picklers.



Assessment for learning happens in every lesson but we use a system where teachers are clear what has been achieved and where the gaps are. It offers support in informing future planning, retrieval quizzes and activities that would cover the gaps. The children's knowledge is easily tracked, embedded and monitored across the school, as everyone has access to the cover sheets via our cloud platform.

Each science lesson starts with a short retrieval quiz: previous lesson, previous unit, previous year.

Science Learning

Pre-PSQM

During PSQM

Impact

L.C. The science capital teaching approach e.g making links to the school's locality and personal experiences, is used to engage children in science learning.

The science capital teaching approach e.g making links to the school's locality and personal experiences, is used to engage children in science learning.

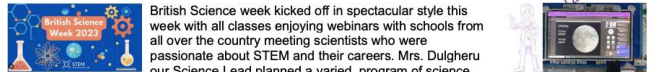
As a very small school, in a rural area we try and map out enrichment activities that will enhance the children's understanding of the wider world. We aim to build their cultural capital by creating links with the local community and facilitate experiences otherwise unachievable for many of our parents.

STEM week was celebrated by having an array of guest speakers, talking to the different careers that can or are related to science.

Exposing the children to an array of careers has stimulated their thinking and extended their understanding of what a scientist does.



Throughout the year we take the children on various trips- Waste Centre, Eden Project, Dartmoor geology expedition.



British Science week kicked off in spectacular style this week with all classes enjoying webinars with schools from all over the country meeting scientists who were passionate about STEM and their careers. Mrs. Dulgheru our Science Lead planned a varied, program of science, technology, engineering, and math's activities to celebrate British Science Week. Our INTENT was to inspire and encourage our children to be excited and engage with science, to ASPIRE to become ambassadors for science, and ultimately to be empowered to challenge and influence British science in the future through their career choices. We have learnt this week the importance of children understanding how science works in the real world. We have learnt how scientific investigations brings science to life and affords children the opportunity to work scientifically, fostering science skills such as observing, exploring and asking questions. Erin's dad PC Higham delivered a wonderful presentation involving experiments and apparatus as he told us all about her Fascinating career as a police Diver. The children were fascinated as PC Higham with his able assistant demonstrated how he was able to remain underwater for so long and the science of diving. PC Higham showed how his protective Dive suit and specialist equipment have been developed to enable him to carry out his role under the most difficult circumstances when visibility is compromised. PC Higham also showed footage of the equipment he controls to aid his search. The engaging presentation involved discussions with lots of opportunities to ask lots of questions. We are immensely grateful to PC Higham for his hugely engaging and inspirational presentation. Our young investigators were inspired by the visual presentation and to be able to interact with equipment that they have only seen on the TV evoked awe and wonder.









Expert talks, hands on approaches are at the core of our teaching. The children ARE the scientist, they are doing the experiments and they are finding out about our world. By having a range of opportunities in school and trips, the children get to understand what it is to be a geologist, botanist, to work in a research facility, a police diver or a ranger or a farmer. Exploring, doing and talking to the real people, doing the real jobs has opened the horizons of many children.

We try to enhance the provision by using the Developing Experts website showing the children the various careers you can have related to each unit studied. They particularly enjoy watching the expert videos.



We are SCIENTISTS

 Health Physicist	 Information Scientist
 Vet	 Ambulance Care Assistant
 Care Escort	 Community Transport Driver

Science Wider Opportunities

WO. Teachers identify and map science skills to a range of other subjects.

Pre-PSQM

During PSQM

Impact

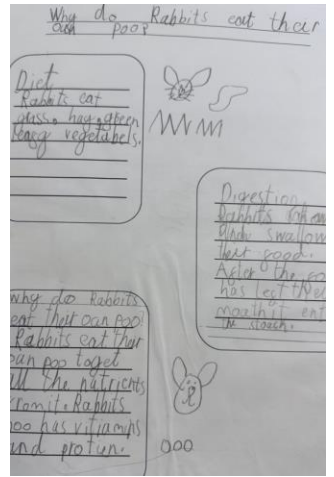
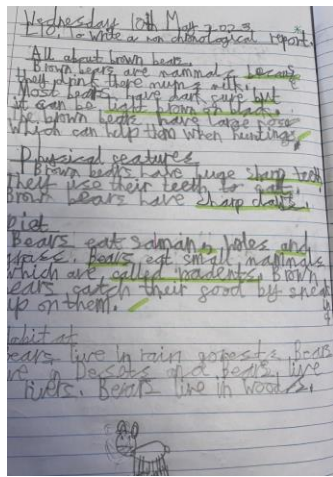
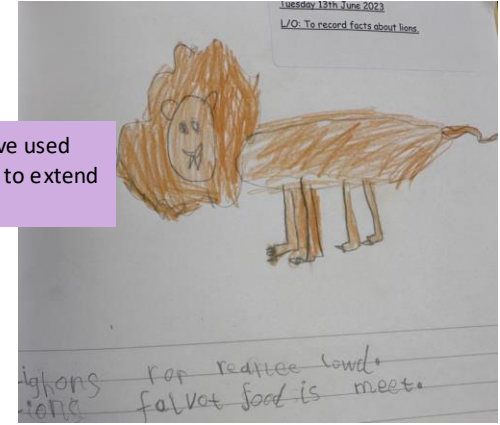
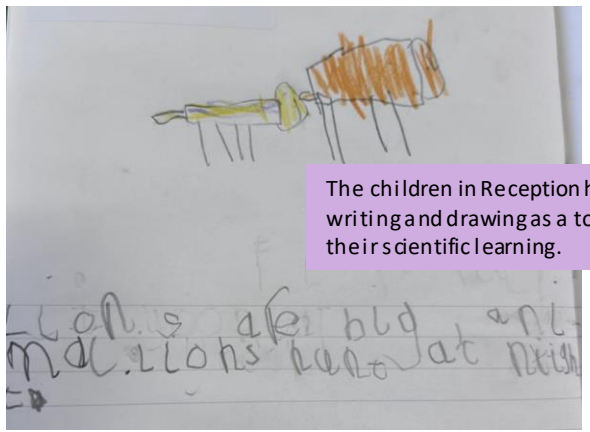
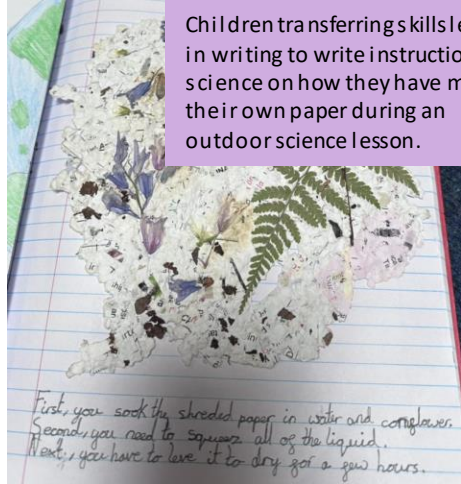
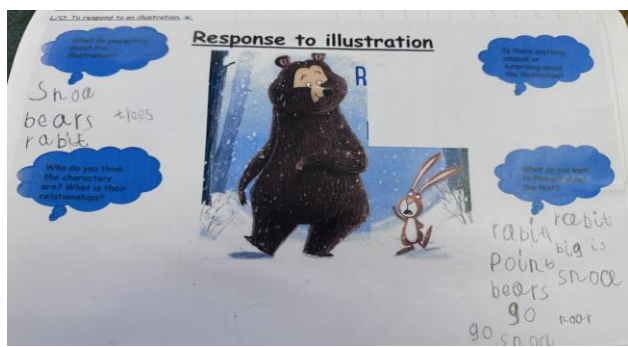
Teachers identify and map science skills to a range of other subjects.

This academic year we have focused in creating links between the subjects. We have successfully begun this process, which is mainly visible in our Writing books, where we tried to link the inspiration text with our scientific units. There is also a crossover of skill between maths and Science.

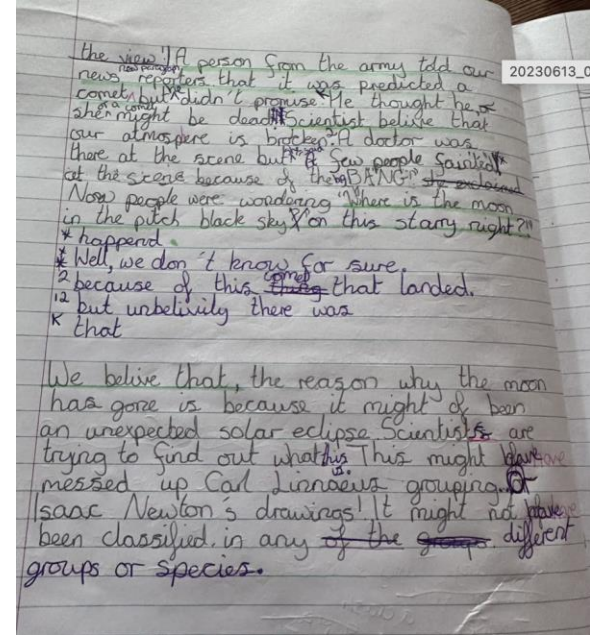
Teachers are praising the meta cognitive development they see in children since we have tried to map and link the curriculum.

Children transferring skills learnt in writing to write instructions in science on how they have made their own paper during an outdoor science lesson.

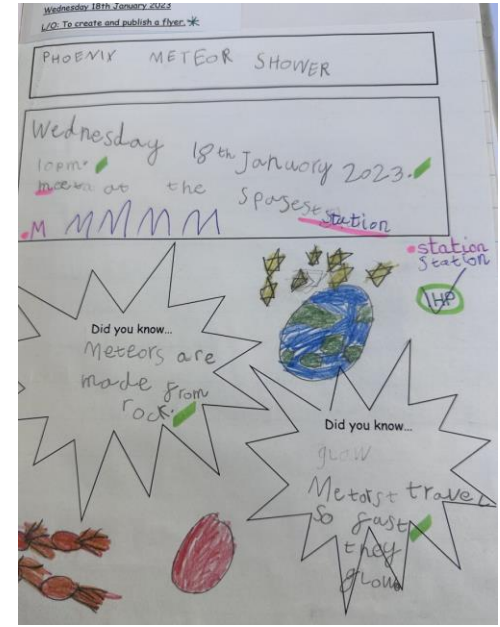
The children in Reception have used writing and drawing as a tool to extend their scientific learning.



By creating the links between units and subjects, the children are starting to see the curriculum as a web that is interconnected and relate it more to the wider world, rather than 'just a nother subject'. The connections made, elevate their interests in other subjects, such as Geography. Child A 'We learnt about the Water cycle in Science, now in Geography.' Associating books, texts and workshops with the science units, ensures the children are exposed to a variety of sources and that they have enough information to form their own opinions about the world around them and the importance of science.



Scientific based texts such as Look up, Pebble in my pocket, Lost words, have enthused even the most reluctant readers to enjoy reading for pleasure.



Year 4's creating Lunar myths, based on the Moon Man book, during the Science unit-Space.

Attempting to create links with prior knowledge : classification.

The children in year 1 and 2 have looked a variety of animals and have used the writing sessions to research more about their habitat, diet and other interesting facts.

Year 1's making posters in writing, based on the book Look Up, during the Science-Space.

Science Wider Opportunities

Pre-PSQM

During PSQM

Impact

WO. There are regular links with other organisations to enhance/enrich science learning.

There are regular links with other organisations to enhance/enrich science learning.



Dartmoor rangers and local Eco group – rewilding and conservation project. The children built bird houses and made bug hotels to place at our school field and village fields and allotments.



Devon Waste- Litter picking project in our locality

Tree planting with parents. The children with parents volunteers, teachers and the wider community planted 150 on our school field. The work was done in partnership with The Woodland Trust.



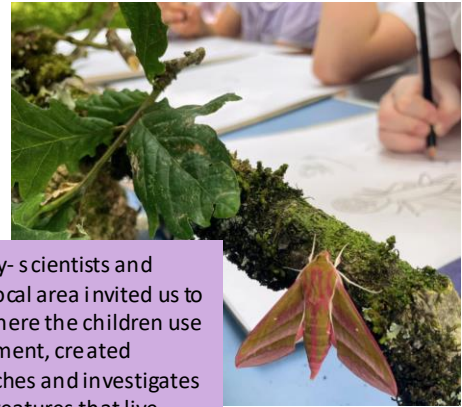
By having access to exciting, inspirational science lessons and experiences, we started to give the children a solid scientific grounding which is essential in developing their scientific thinking.



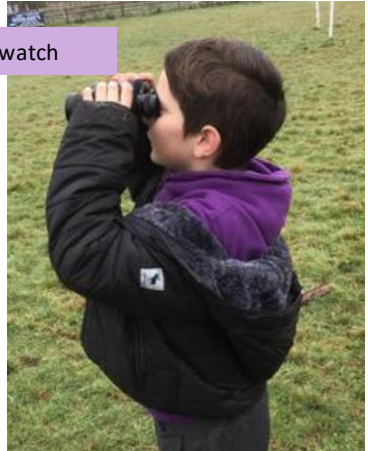
The specialist led activities, hands on activities the children undertook, made the pupils believe they are doing sound science, that they are real scientists. The experiences have fostered an ambition to take it further because the children were able to see that their investigations and accomplishments have created a bigger picture.



Jenny Hale Day- scientists and artists in the local area invited us to a workshop where the children use science equipment, created scientific sketches and investigated animals and creatures that live around us.



RSPB Bird watch



The various projects meant to enhance the children's cultural capital has elevated the buzz and excitement around science within school. It has allowed teachers and pupils to take part in 'real' collaborative science and put into practice the scientific skills learnt within the science lessons.



Dental Peninsula- Oral Health Hygiene. Age-appropriate workshops and whole school assembly.

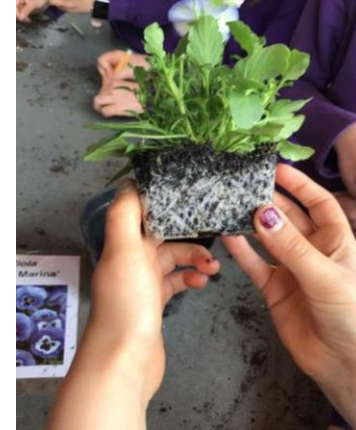


Science Principles in action

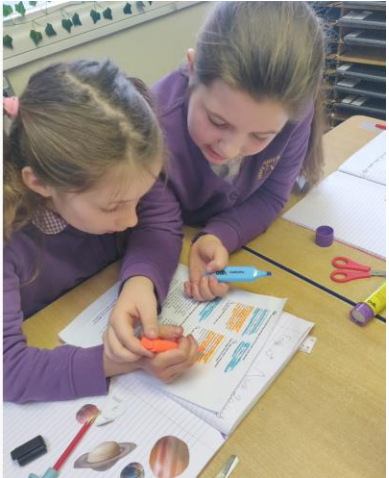
Science is the great outdoors



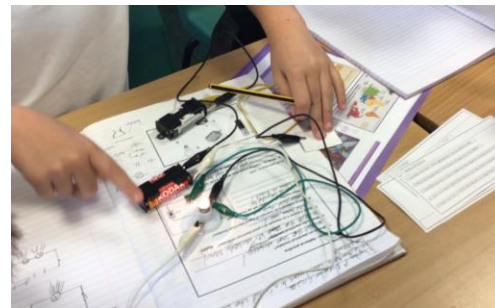
Science is collaboration



Science is questioning



Science is discovering



Science is engaging

Science is fun