

1. Year 1 section of our new substantive knowledge framework

Year 1	Autumn term 1	Autumn term 2	Spring term 1	Spring term 2	Summer term 1	Summer term 2
	Everyday Materials		Animals Including Humans	Seasonal Changes	Plants	Animals including Humans
	Know the following everyday materials: wood, plastic, glass, metal, water, rock, brick, paper, fabric and foil. Know the difference between an object and the material from which it is made. Know the simple physical properties (hard/soft, stretchy/stiff, shiny/dull, rough/smooth, bendy/not bendy, waterproof/ not waterproof, absorbent/not absorbent, opaque/ transparent) of the above everyday materials.		Know the following parts of the human body: hair, head, ears, eyes, nose, mouth, tongue, teeth, chin, neck, shoulders, arms, elbow, wrist, fingers, back, abdomen, legs, knees, ankles, feet, toes. Know the 5 senses; touch, smell, taste, sight, hearing. Know which part of the body is associated with each sense.	Know the four seasons; Autumn, spring, summer, winter Know the weather associated with each season. Know what happens in each of the seasons. Know the changes across the 4 seasons. Know that in winter days are shorter, and in summer days are longer. Know that it is not safe to look directly at the Sun.	Know the meaning of deciduous and evergreen. Know a variety of deciduous and evergreen trees. Know the following parts of deciduous and evergreen trees: roots, trunk, branches, leaves. Know a variety of common flowering plants. Know the basic structure of a variety of common flowering plants, including trees: roots, stem, leaves, flower Know the following parts of plants: leaves, flowers (blossom), petals, fruit, roots, bulb, seed, stem.	Know a variety of common animals (vertebrates) including fish, amphibians, reptiles, birds, and mammals. Know the structure of common vertebrates: fish, amphibians, reptiles, birds, and mammals. Know how the structure of common vertebrates differs between the 5 classes. Know which animals are commonly kept as pets. Know the meaning of carnivore, herbivore, and omnivore.

Impact: All statements are tight to the NC and can be lifted as exact lesson objectives. All statements start with ‘Know’ so teaching of substantive knowledge is now tight and specific.

	Strand	EYFS	Year 1
Exploring	Questioning	Explore ‘what if’ questions.	Know how to ask ‘why’ questions.
	Observing	Know how to show curiosity in the natural world.	Know how to observe changes during an investigation.
	Explaining	Know what is happening in the world around me.	Know how to orally explain my observations.
	Diagrams	Know how to orally label pictures.	Know how to match a picture to the correct label.
Classification	Secondary sources	Know how to orally recall some simple learnt scientific facts.	Know how to orally recall some simple learnt scientific facts to answer a given question.
	Identifying	Know by name simple things related to science.	Know how to identify simple similarities, differences, properties and characteristics.
	Comparing	Know how to identify visual differences.	Know how to identify similarities and differences.
Experimenting and Investigating	Classifying	Know how to classify by familiar visual features.	Know how to classify by given physical properties.
	Predicting	Know what might happen next.	Know that events can be sequenced.
	Designing	Know what we are investigating.	Know there are different ways to start an investigation.
	Using equipment	Know how to use simple scientific equipment.	Know how to how to use simple scientific equipment.
Data	Working Safely	Know how to follow simple safety instructions.	Know how to identify hazards.
	Collecting data	Know how to use non-standard units of measure to compare 2 things.	Know how to use non-standard units of measure to compare multiple things.

2. Year 1 section of our disciplinary knowledge framework.

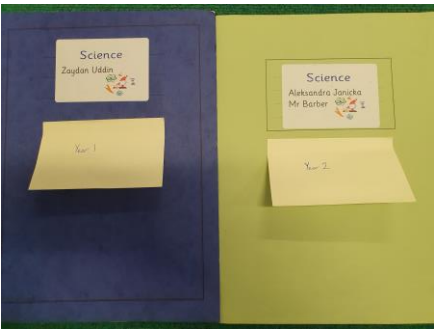
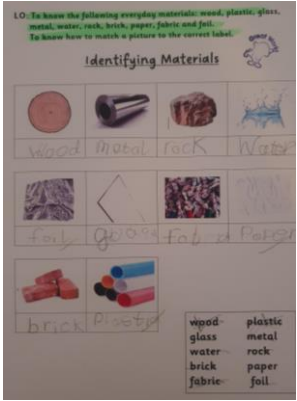
Impact: All statements are tight to the NC and can be lifted as exact lesson objectives. All statements start with ‘Know how to’ so teaching of disciplinary knowledge is now tight and teaches specific skills.

Key need: Provide strategic support to KS1 to enable improvement in implementing our intent / progression framework.

3. Planning support provided.

Using the progression map	No negotiables	Progression map	Progression map	Links between NC and progression map
Dual objectives	Science needs to be taught in discrete lessons using discrete worksheets Science needs to be taught weekly Science needs to promote discovery of knowledge rather than teacher imparting knowledge All classrooms need a science learning journey	Wapped out into half termly / yearly ‘units’	Wapped out into strands and progressive across year groups	NC Progression map
Working scientifically	Working scientifically	Monitoring so far...	Dual objectives	Creating knowledge objectives
Matching a working scientifically objective	Print the objectives	Activities need to match the objective	At the end of the lesson...	Extra / further learning only when progression map objectives for all been covered

Impact: Science is now taught weekly and discrete in KS1, which has allowed for full implementation of the progression framework.



5. KS1 discrete science books, KS1 science timetable and implementation example.

Impact: Staff have clear knowledge and have been provided with clear examples of how to implement our intent / progression framework. Staff have increased confidence regarding implementation.

4. Staff quote on support provided.

‘The way the progression framework is now written allows for easier implementation using dual objectives.’ – Mrs R (year 1 teacher and curriculum lead)

1. CPD provided to both ECTs – training title and website link.

Scientific enquiry

<https://www.ase.org.uk/system/files/Scientific%20Enquiry%20in%20the%20UK%20V2.pdf>

Impact: ECTs have developed a general overview of scientific enquiry, and ideas of what science should look like in practice.

2. Annotated (yellow) example of planning, used to breakdown and model the planning process during the a CPD meeting.

Objectives Take directly from progression framework (dual objectives)	Review: Can children match the component label to the component symbol. Always start with a review of prior learning, which helps children to recall and remember prior knowledge and links prior knowledge to new learning.	• Start with the substantive objective.
To know how to construct a circuit diagram using correct symbols.	New learning: Children to refer back to their first circuit picture from lesson 2. Use prior learning to support new learning. Model drawing a complete electrical circuit. Highlight the need for accuracy and detail in symbols. Emphasis recording like scientists. Highlight the need for there to be no gaps. Links to prior learning. Children to draw their circuit. Then children to label each component of their drawing. Children to annotate their diagram with the following: What is the function of the battery? What is the function of the wires? Children to answer the following questions in their books: Why have you chosen a closed switch and lamp? Why does the electrical circuit work? What would happen if there was a gap in the electrical circuit? Use oral discussion to promote reasoning and oracy. Links to our intent. Activities / evidence must and will meet the objective – check back once the lesson has been planned.	• Match an appropriate disciplinary objective.
Year 5 – To know how to draw and label a diagram / model with scientific information.		• Decide on the knowledge that needs to be taught.
Year 6 – To know how to draw, label and explain a diagram / model with scientific information.		• Decide how you will teach this – discovery led if possible.
Disciplinary objectives must be year group specific.		• What will this look like in books?
		• Support resources
		• Could learning go a step further to deepen / extend understanding?
		• Check that teaching / evidence will allow children to gain and demonstrate knowledge of the objectives.

Impact: ECTs have develop knowledge of the planning process and the purpose of each stage. They have a clear model to follow for their own planning.

Key need: Provide strategic support to Early Career Teachers (ECTs) who are new to the school.

3. Quote from year 5 ECT.

‘Since seeing the planning process modelled, I feel more confident in how to plan and link it to the vision’ – Miss S (year 5 teacher)

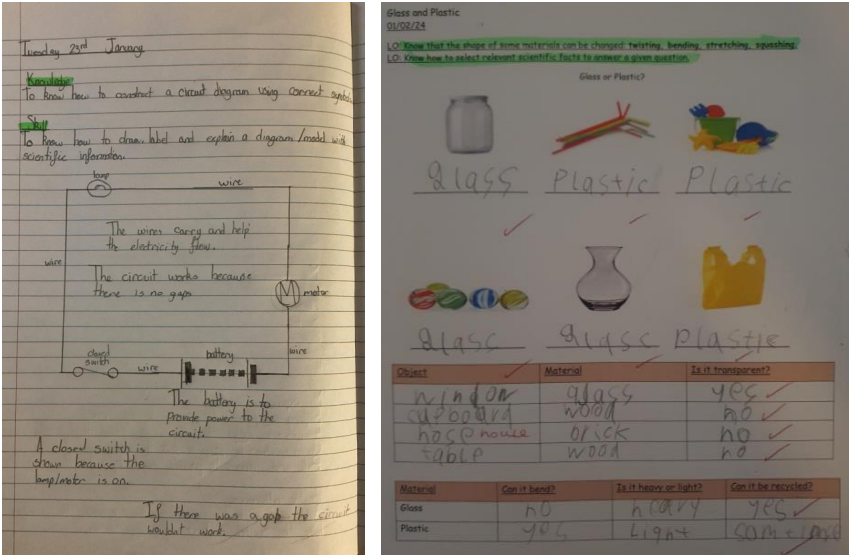
Impact: ECTs have clearly understood the CPD provided. ECTs are able to plan effectively. Children develop accurate knowledge that achieves the progression framework objectives. Children have knowledge.

Impact: Both members of staff have developed confidence and knowledge, which leads to better experiences for children.

4. Quote from year 2 ECT.

‘Using the progression framework objectives and building from their helps to keep my planning focused.’ – Miss H (year 2 teacher)

4. Evidence of children’s work showing impact of knowledge developed by ECTs



1. Monitoring cycle timetable including: planning analysis, lesson visits, work analysis and pupil interviews.

Key need: Implement triangulated monitoring which includes lesson visits and developmental feedback.

Science monitoring timetable 2023 / 2024

	Year groups	Planning analysis	Lesson visits	Work analysis	Pupil voice
Autumn 1	1, 3, 5	WC 11.09.23	WC 25.09.23	WC 09.10.23	WC 16.10.23
Autumn 2	2, 4, 6	WC 06.11.23	WC 27.11.23	WC 11.11.23	WC 18.11.23
Spring 1	1, 3, 5	WC 08.01.24	WC 22.01.24	WC 29.01.24	WC 05.02.24
Spring 2	2, 4, 6	WC 19.02.24	WC 04.03.24	WC 18.04.24	WC 25.04.24
Summer 1	1, 3, 5	WC 15.04.24	WC 29.04.24	WC 13.05.24	WC 20.05.24
Summer 2	2, 4, 6	WC 03.06.24	WC 17.06.24	WC 01.07.24	WC 08.07.24

2. An example of monitoring feedback provided to LKS2.

	Focus	Strengths	Areas for Development	Actions
2.10.23 JB / VH Year 2 MTP	Coverage of substantive knowledge from autumn term units of work. Inclusion of dual objectives to show coverage of disciplinary knowledge. Identification of key vocabulary.	•Dual objectives planned for in most lessons (4/6) •Clear link to reading – Lesson 2. •Key vocabulary included.	•Practical and engaging activities planned for but activities as a whole are not tight enough to ensure children achieve the objective and learn required substantive knowledge. •Limited substantive knowledge being taught. •Not all substantive knowledge objectives planned for.	•Speak with planning team to ensure that all substantive knowledge objectives are planned for and that activities and teaching of knowledge tightly matches the objective (spoke to JB, who completed planning, at lunch time on 20.10.23) •Speak to planning team about number of lessons (spoke to JB, who completed planning, at lunchtime on 20.10.23)

3. Explanation of follow up support.

I met with the planning team to coach them through the planning process. We worked together to create dual objectives. Then we ordered the sequence of learning to make sure it was progression. I then provided ideas for individual lessons which the team then used in their STP.

Impact: The planning team saw and developed knowledge of using the progression framework to plan. Plan now matches the progression framework objectives.

Impact: Children have been taught, know and remember knowledge from the progression framework. Children can explain and apply their knowledge.

‘Some materials can change shape. Plastic can be bent but glass can’t. This is why glass is better for windows [than plastic].’ AJ (year 2 child).

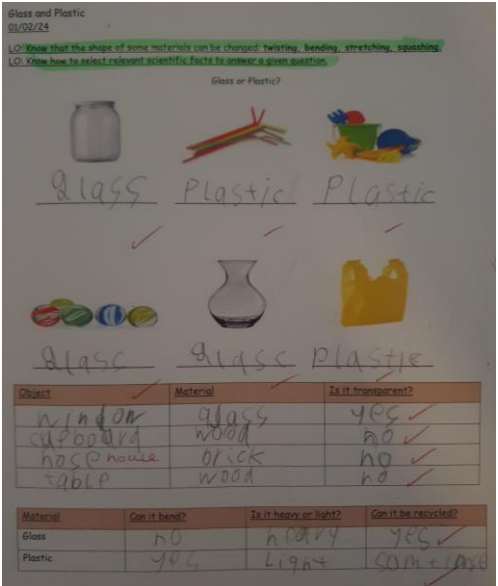
5. Pupil voice quote.

Impact: Lesson objectives are now taken directly from the progression framework, meaning children are learning NC knowledge. The evidence in books is matched to the objectives and allows children to demonstrate knowledge of achieving the objectives.

4. Pupil work showing implementation of monitoring feedback.

6. Quote from link governor following work analysis monitoring.

Josh [SL] was clear in analysing the samples of work and identified specific steps to improve children’s learning.’ – ST (curriculum link governor)



1. Whole school science timetable.

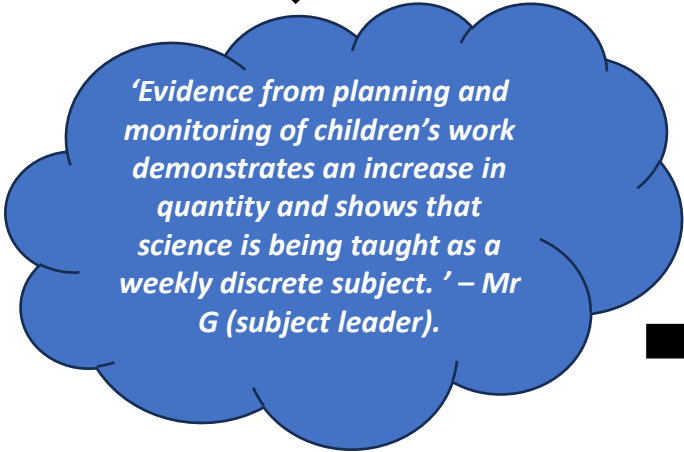
Care - Opportunity - Success Our Intent - Oracy, Reading, Life Skills, Experiences

Whole school science timetable

	Monday	Tuesday	Wednesday	Thursday	Friday
First session					
Second session				4B	
Afternoon	1R 2B	1S 2H	6G 3C	5S 3/4K	5/6A

Impact: All children are now taught science weekly and develop new knowledge weekly, which allows them to build their knowledge to more and remember more.

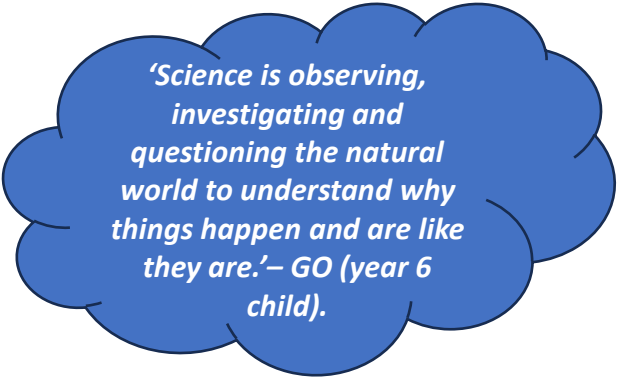
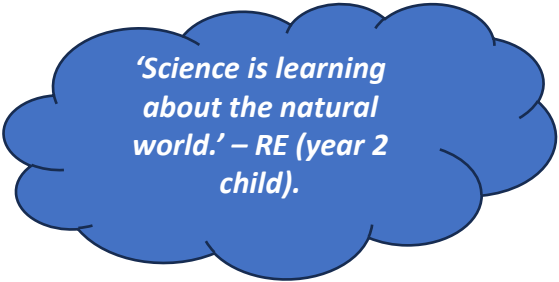
2. Quote from subject leader.



Impact: All children learn to record like scientist. They are able to see how prior knowledge is used to build new knowledge. All children, particularly further down school, develop a better understanding of what science is.

Key need: Ensure that science is regularly taught as a discrete subject across school.

3. Quotes from a year 2 and year 6 child about what science is.



Impact: Children see science as a discrete subject. They know what science is. They can identify their scientific knowledge and skills.

3. Discrete science workbooks used across school.



1. Vague and non-progressive objectives from our old progression framework, which can't be lifted as direct lesson objectives.

Know and name the **planets** in our **solar system**.
Understand and explain the movement of the **Earth** and other planets relative to the **sun**.
Understand and explain the movement of the **Moon** relative to the Earth.
Understand and demonstrate how **day** and **night** are created.
Describe the Sun, Earth and Moon (using the term **spherical**).

Key Stage 1
• Know how to ask simple questions and recognise that they can be answered in different ways. • Observe closely, using simple equipment such as a magnifying glass. • Perform simple tests and explain what they are testing and their method. • Identify and classify, giving simple explanations. • Answer questions using my observations and ideas. • Gather and record data, in a given format (eg: table) to help answer questions. • Retrieve information from observations to answer questions. • Discuss my observations and findings.

Key need: Improve the implementation of our disciplinary framework objectives.

4. Staff quotes on dual objectives

Impact: Children know more and remember more substantive and disciplinary knowledge.

‘Dual objectives allow the progression framework to be implemented fully and children seem to remember more through recalling their experiences.’ – Mrs A (year 5/6 teacher and deputy headteacher)

‘Dual objectives mean children get more practical experiences and learn more through discovery and use of equipment.’ – Mrs K (year 3/4 teacher)

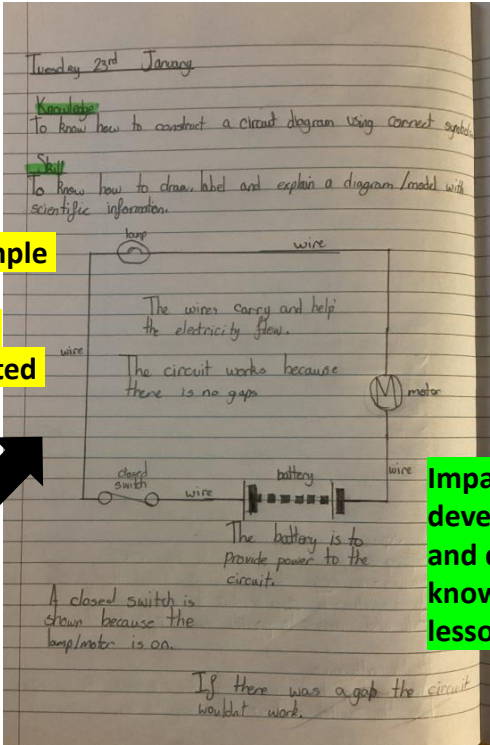
5. An example of how dual objectives have since been implemented into our history and geography lessons.

Autumn term 2
Earth and Space (Y5)

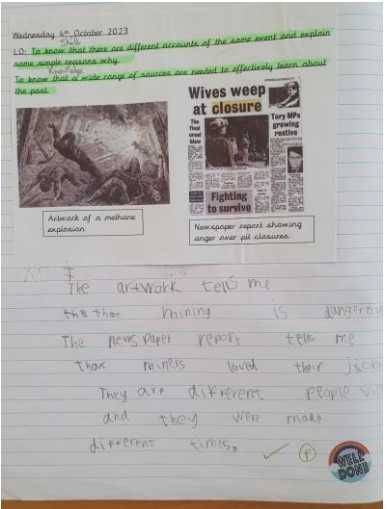
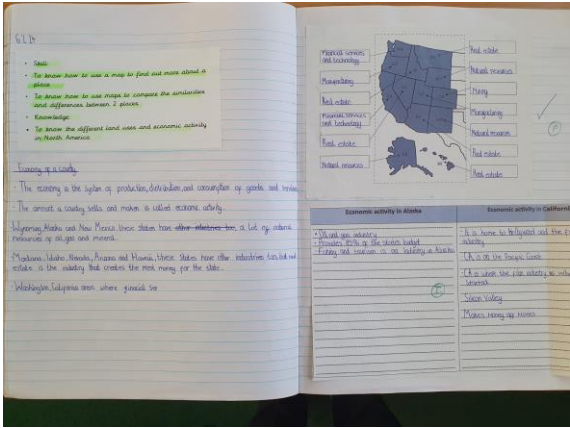
Know the eight planets of the solar system in order.
Know that the Sun, Earth and Moon are approximately **spherical** bodies.
Know that heliocentric means that all planets revolve around the sun.
Know that the **sun** is a star that is static at the centre of the solar system.
Know the movement of the **Earth** and other **planets** relative to the sun.
Know the movement of the **Moon** relative to the Earth.
Know that **day** and **night** are created by the rotation of the Earth.

2. Tight and progressive objectives from our new progression framework, which can be lifted as direct lesson objectives.

3. An example of dual objectives implemented in lessons.



Impact: Children develop substantive and disciplinary knowledge in all lessons.

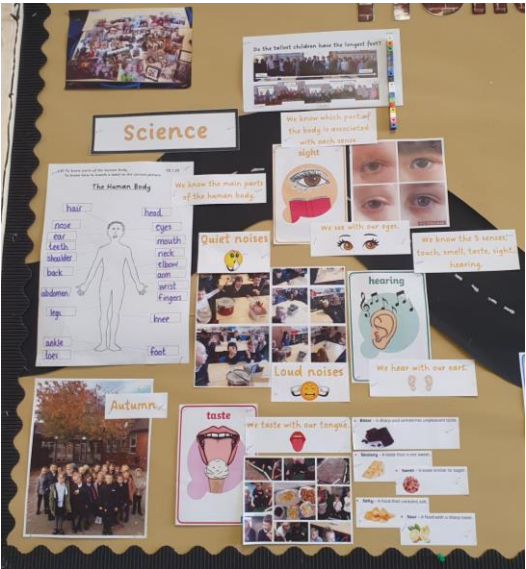


Classifying	Know how to classify by familiar visual features.	Know how to classify by given physical properties.	Know how to create my own criteria for classifying.	Know how to construct a simple classification key using given information.
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1. An example of previous classroom displays in school which varied in quality, lacked structure and showed limited key knowledge.



2. An example of the learning journeys which are present in each classroom.



Impact: children have visual key knowledge journeys which support their learning. Children can link prior knowledge to current knowledge. Teachers can use learning journeys to review prior learning and support children's recall of prior knowledge.

'It shows what I need to remember.'— ZU (Year 1 child)

3. Quote from a year 1 and year 6 child about the learning journey in their classroom.

'We use it in our review at the start of lessons. It reminds me to use past learning to help what I'm learning today.' ZT (Year 6 child)

Key need: Improve the quality of science displays, resources and texts throughout school.

4. An example science book display in a classroom.



5. The section of our school library which is solely dedicated to science.



Impact: As a result of continued participation in the Royal Society Young People's book prize, children in most classrooms have access to a range of high-quality science literature. Children are able to independently further their in-class learning, or further their knowledge of scientific topics of interest. Children draw the link between science and reading for pleasure.

1. Our original forest school site, which included a small natural area of land with 3 trees and another small area with limited resources.



Key need: Expand and develop our forest school area due to having no natural green space on our school site.

3. Year 2 children developing their knowledge of plants in one of our forest school areas.



Impact: More children now have access to more resources and more spaces to extend their curriculum learning beyond the wall of the classroom.

2. Our new forest school areas, which included the following specific designed and equipped areas:

- 1. The allotment
- 2. The secret plant garden
- 3. Forest school
- 4. The flower garden
- 5. Natural corner
- 6. The green house



4. Quote from year 2 child about forest schools.

'Friday is my favourite day. I love forest schools. We learn loads about nature. I never knew so many things live in [our] school.' – DR (Year 2 child)

Impact: Children link their classroom learning to the natural environment around them and can see and apply their knowledge in real life situations around school. Children are more excited about science and develop an interest from an early age.



1. The disciplinary knowledge section of our old progression framework, which included broad and vague objectives, lacked any clear progression in skills, and was open to interpretation when implemented.

Key need: Increase the effectiveness of the disciplinary section of our progression framework.

	Foundation Stage	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
Working Scientifically	- Know how to make simple observations. - Know that plants grow. - Recognise the difference between living plants and plastic ones. - Understand that we need to look after our plants. - Know how to record the differences seen as plants grow.	- Know how to ask simple questions and recognise that they can be answered in different ways. - Observe closely, using simple equipment such as a magnifying glass. - Perform simple tests and explain what they are testing and their method. - Identify and classify, giving simple explanations. - Answer questions using my observations and ideas. - Gather and record data, in a given format (eg; table) to help answer questions. - Retrieve information from observations to answer questions. - Discuss my observations and findings.	- Ask relevant questions and use different types of scientific enquiry to answer them. - Set up practical enquiries, comparative and fair tests. - Make systematic and careful observations. - Take accurate measurements using a range of equipment e.g. thermometers / data loggers. - Gather, record, classify and present data in different ways. - Answer questions using my data. - Record findings using simple scientific language, drawings, labelled diagrams, keys, tables and bar charts. - Give written and oral explanations, displays and presentations of results and conclusions. - Use results to make conclusions, predictions, suggest improvements and raise further questions. - Identify differences, similarities or changes in scientific ideas. - Use simple evidence to answer questions and support findings	- Plan different types of scientific enquiries to answer questions. - Raise relevant questions, ideas and arguments to challenge scientific ideas and conclusions. - Recognise and control variables. - Take measurements, using a range of scientific equipment, with accuracy, taking repeated readings and averages when appropriate. - Record data using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. - Interpret these diagrams, tables and charts. - Use test results to make predictions and set up further comparative and fair tests. - Report and present findings from enquiries, including conclusions, causal relationships and explain the degree of trust in results, in oral and written forms, displays and presentations. - Identify scientific evidence to support or refute ideas or arguments.



2. A cross section of the disciplinary knowledge section of our new progression framework, which shows strands of skills, which are broken down into clear progression objectives from EYFS through to year 6.

Impact: The progression of disciplinary knowledge now allows children to build their scientific skills in clear steps, using prior knowledge to support new learning.

Experimenting and Investigating	Predicting	Know what might happen next.	Know that events can be sequenced.	Know how to use my experiences to explain what might happen.	Know how to predict cause and effect (casual prediction).	Know how to predict a trend (relationship prediction).	Know how to use knowledge and understanding to generate and explain a testable hypothesis.	Know how to generate a testable hypothesis and consider variables when making predictions.
	Designing	Know what we are investigating.	Know there are different ways to start an investigation.	Know what and how we might investigate.	Know how to explain what the independent variable is and how we might investigate it in a given experiment.	Know how to explain what the independent and control variables are and how we might investigate in a given experiment.	Know how to explain what the independent, dependent and control variables are and how we might investigate in a given experiment.	Know how to design and conduct fair and comparative tests, which consider independent, dependent, and control variables.
	Using equipment	Know how to use simple scientific equipment.	Know how to how to use simple scientific equipment.	Know which equipment will be suitable for a given investigation.	Know how to explain reasons for selecting specific equipment for a given investigation.	Know how to explain reasons for selecting specific equipment for a given investigation and identify possible alternatives.	Know how to explain reasons for selecting specific equipment for an independently designed investigation.	Know how to explain reasons for selecting specific equipment for an independently designed investigation and identify possible alternatives.
	Working Safely	Know how to follow simple safety instructions.	Know how to identify hazards.	Know how to identify hazards and possible consequences.	Know how to identify hazards, possible consequences and possible mitigations.	Know how to demonstrate safe working practices when using a variety of scientific equipment.	Know how to alter an investigation to implement mitigations and reduce risk.	Know how to design an experiment which uses mitigations to minimise risk.

3. Staff quote on our new disciplinary framework.

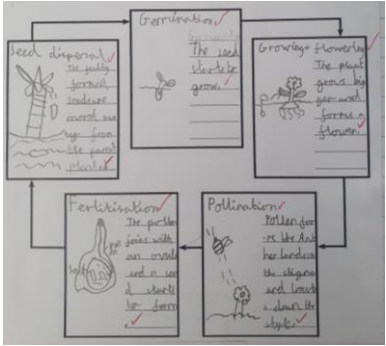
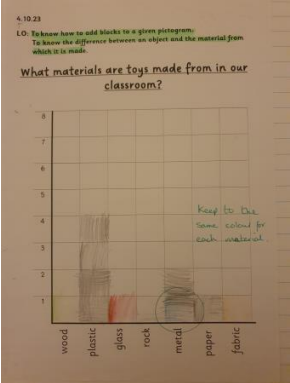
‘The progression in skills is clear. This helps when teaching a mixed age class as I can see what different year groups should be learning and what it should look like.’
– Mrs K (year 3/4 teacher)



L.O. To know there are different ways to start an investigation. To know the simple physical properties.

What is the best material for an umbrella?

	Is it waterproof?	Is it heavy?	Is it strong?	Would it make a good umbrella?
wood	✓	✗	✓	✗
plastic	✓	✗	✓	✓
fabric	✗	✗	✓	✗
metal	✓	✓	✗	✗
foil	✓	✗	✗	✗
glass	✓	✓	✗	✗
brick	✓	✓	✗	✗
rock	✓	✓	✓	✓



4. Evidence of implementation.

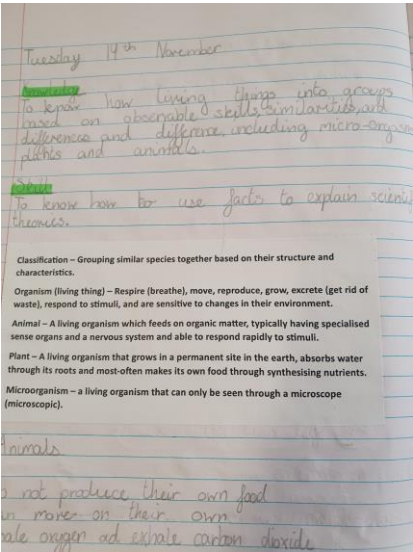
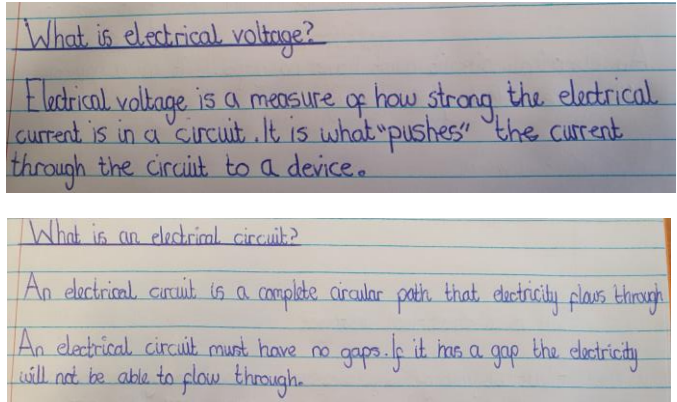
Impact: Staff are more confident in implementing the disciplinary section of the progression framework.

1. A cross-section of our science glossary used by all staff across school.

are - Opportunity - Success Our Intent - Oracy, Reading, Life Skills, Experiences

Science Terminology		
Term	Meaning	Example
Seasons	Seasons are changes in the weather where we live, caused by the Earth being closer to or further away from the Sun. There are four seasons in a year in the UK; spring, summer, autumn and winter.	autumn, winter, spring, summer
Autumn	Autumn is when it starts to get cooler and less sunny. There are gradually less hours of daylight. In the UK, the autumn months are September, October, November.	
Spring	Spring is when the Earth starts to warm up and plants start to grow. In the UK, the spring months are March, April, May.	
Summer	Summer is when the sun shines more and for longer. In the UK, the summer months are June, July, August.	
Winter	Winter is when the days get shorter, and the weather is colder. In the UK, the winter months are December, January, February	
Weather	The conditions in the air, in a particular place, such as wind, rain, or temperature.	rain, sunshine, snow, wind, fog
Animal	An animal is a living thing that can move and eat and reacts to the world through its senses.	
Natural world	The natural world is all of the animals, plants, and other things existing in nature and not made or caused by people.	
Hibernation	Hibernation is when an animal or plant spends the winter in a deep sleep that helps them to save energy and survive the winter without eating much.	
Float	To float is to rest or move on or near the surface of a liquid without sinking.	
Sink	To sink is to go down below the surface of a liquid and become submerged.	

2. Evidence of implementation in books and children learning accurate, scientific definitions.



Key need: Improve children’s learning of vocabulary through implementing a glossary of terms across school.

1. What is friction?

‘A type of force that gives resistance when an object moves across a surface [...] the resistance.’ – DR (Y4) Recalled with ease – amongst word for word from glossary.

2. What is magnetic force?

‘The attraction or repelling of electrically charged particles.’ – LJ (Y4) using other key knowledge (attract and repel to explain definition. Use of electrically charged particles from glossary.

3. Explain how and why the rubber and pencil would move differently on the table.

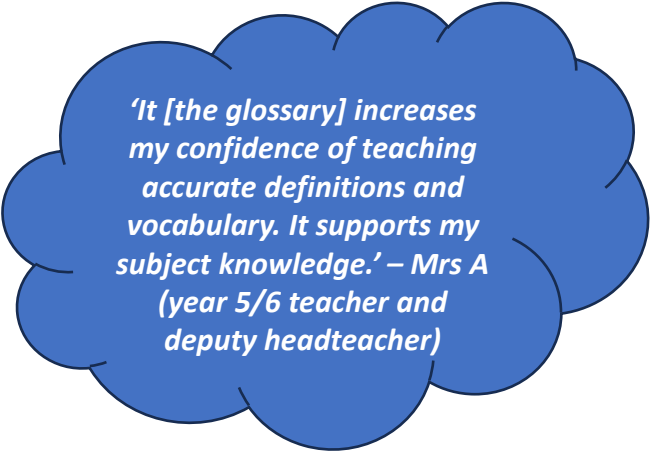
‘Because of friction’. The rubber and table would create more friction so it would move slower. The pencil would move faster. The pencil is smoother. – LJ and DR (Y4). Links to prior material knowledge. Cause and effect disciplinary knowledge. Clear understanding of friction. |

3. Pupil voice summary notes from year 3 and 4.

Impact: All children are taught accurate scientific definitions, which are consistent across school, thus eliminating the issue of children learning inconsistent definitions and becoming confused.

Impact: Teaching of vocabulary is much tighter and more accurate across school. Children are able to recall accurate definitions due to repetition and accuracy of teaching. Children display more confidence when using scientific vocabulary.

4. Staff quote on the impact of our glossary.



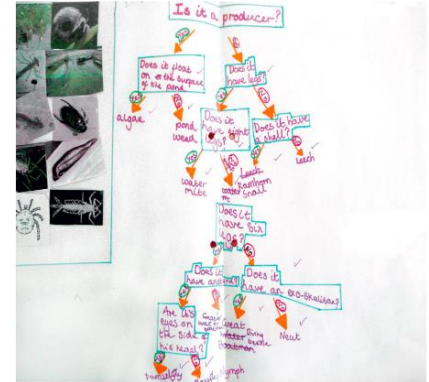
Impact: Staff are more confident in teaching vocabulary and develop their subject knowledge so that children’s learning is accurate.

1. SLT quote on our previous assessment methods in science.

‘Although teachers assess science formatively and, in some cases summatively, the accuracy and evidence for assessments varies across school.’ – Mrs A (year 5/6 teacher and deputy headteacher)

2. Use of standardisation material

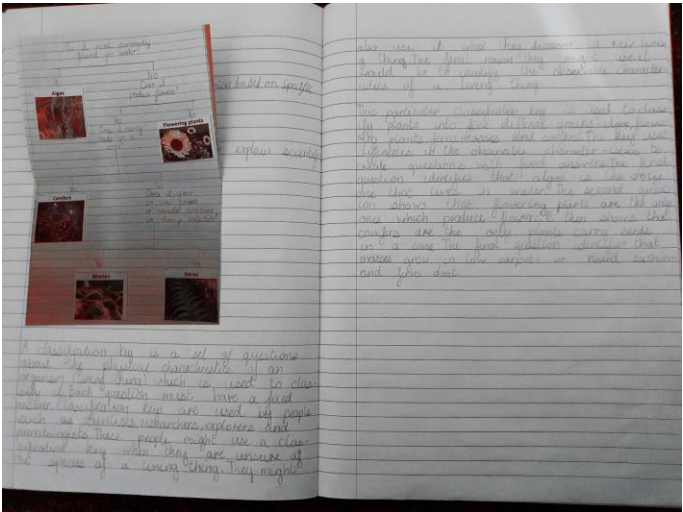
Title	Making a classification key: pond animals
Science content statement(s)	The pupil can use the observable features of plants, animals and microorganisms to group, classify and identify them into broad groups, using keys or other methods (year 4).
Working scientifically statement(s) (if applicable)	The pupil can, using appropriate scientific language and ideas from the national curriculum, record data and results using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.
Context	In previous lessons, pupils had conducted fieldwork at a local Royal Society for the Protection of Birds nature reserve, including pond dipping. They looked at the observable features of the animals they found in the pond, and used classification keys to identify them. In this activity, pupils were asked to create their own classification key to identify animals found in the pond habitat. They were told to generate their own yes/no questions to sort the animals.
Comment	The pupil used observational evidence to devise clear and appropriate questions that lead to single answers. From this, they then created a classification key to sort and identify a range of pond animals.



Key need: Trial, with the plan to implement, the strategy of TAPS assessment.

3. An example of the TAPS assessment trial in year 5 and 6.

Impact: This allowed for an increase in the accuracy of assess in year 2 and 6 but couldn't be rolled out across school.

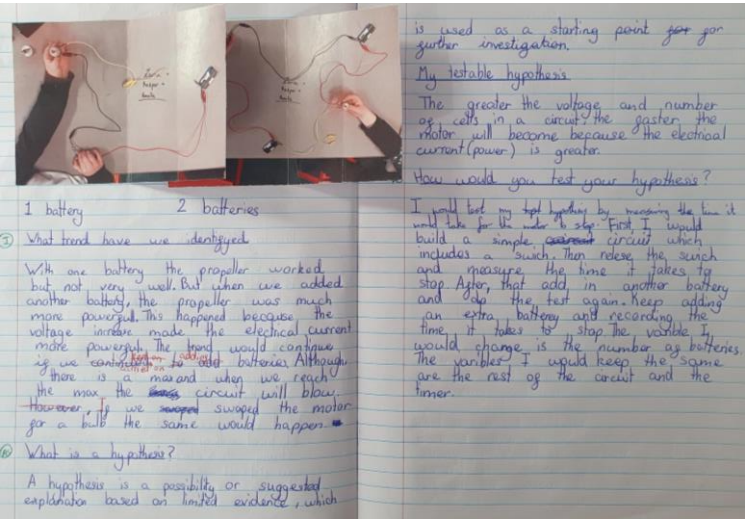


Topic: Electricity	Year 6 Age 10-11	Title: Bulb brightness
Working Scientifically Plan: Plan a scientific enquiry to answer a question, recognising and controlling variables.		Concept Context Compare variations in how electrical components function.
Assessment Focus - Can children create a scientific question which identifies the 'change' and 'measure'? - Can children identify control variables to plan a fair test?		
Activity Today we are going to be electrical engineers. Provide a mix of basic circuit components and challenge pairs or trios to make a quick simple circuit. Compare and discuss the differences in bulb brightness and how to measure/observe this e.g. light seen through layers of paper, datalogger, observation. Main task: To investigate how they can change the brightness of the bulb choosing from the available equipment (to include different lamps, cells and different thickness/length of high resistance/fuse wires). Each pair/trio to generate a list of variables which could be changed in their circuit and how they will observe/measure the effect of this change. Create a scientific question which identifies the 'change' and 'measure'. Record their plan e.g. question, variables and diagram of test circuit. Carry out and discuss investigations.		
Adapting the activity Support: Planning framework to scaffold. Help to decide how to measure the brightness. Extension: Repeat using a different measurement technique. Choose another question to investigate. Other ideas: Try with motors or buzzers.		
Questions to support discussion: - What factors could affect the bulb brightness? - Which variable will you change? (independent variable) - Which variable will you measure / observe? (dependent variable) - Which variables will you keep the same? (control variables) - What is your question? Does it include the 'change' and 'measure'? - Have you found an answer to your question? If yes, what? If not, can you explain why your investigation wasn't able to give you a clear answer?		
Assessment Indicators Not yet met: Can identify what they would like to change but may need support to explain what must be kept the same. Meeting: Identify a range of factors which may affect the brightness of the bulb and define a succinct scientific question to test, e.g. What will happen to the (brightness of the bulb), if we change the (length of wire)? Able to plan a fair test unaided, identifying the different types of variables: what to measure, what to change, what to keep the same. Possible ways of going further: Can identify control variables for a range of investigation questions, e.g. if we look at wire length we need to keep the voltage the same but if we look at voltage we need to keep the wires the same. Notes difficulties with the 'life' of the components.		

4. Staff quote on the trial of the TAPS assessment methods

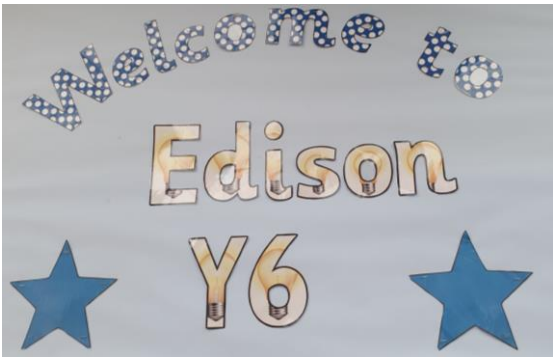
‘Using the TAPS model, I can confidently assess this piece of work and justify it as EXS. Therefore, I can assess any child in my class using the same model.’ JG (year 6 teacher).

Impact: Teachers have more confidence in assessing science using the TAPS model. Assessments are more accurate and robust. Future planning can be tailored to accurately reflect the findings of assessment.



Impact: The accurately of assessment in year 5 and 6 during the trial has increased. Unlike the standardisation materials, the TAPS assessment tool can be used across school and can easily be used to accurately assess work.

1. All classes are now named after scientists.



Impact: The profile of science across school is raised. Children are now aware that scientists do many real-life jobs. Children develop their knowledge of a range of scientists from different backgrounds.

2. All classroom have a display about 'their' scientist.



Key need: Encourage children to think that science is relevant to their lives.

4. Visitors from Notts Trent University speaking to our children about science careers and leading workshops.



Impact: Children developed knowledge of university, which given our catchment areas, raises aspirations. Children learnt about different science careers and extended their knowledge of opportunities within the field of science. Children used equipment and learnt knowledge they would not otherwise have access to.

3. Children have attended external visits to extend and question their science knowledge and to see how it applies to the wider world.



Impact: Children are able to see how their curriculum, classroom learning links to the real-world and their lives outside of school. Children are able to question and extend their knowledge based on their experiences.

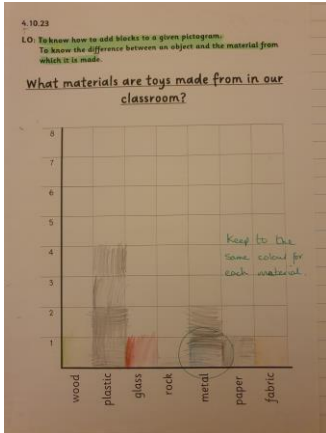


'How can polar bears survive outside the arctic?.' – TR (Year 2 child)

1. READING: Engage with the Royal Society Young people's book prize.



2. MATHS:
Incorporate data strands into our disciplinary framework.

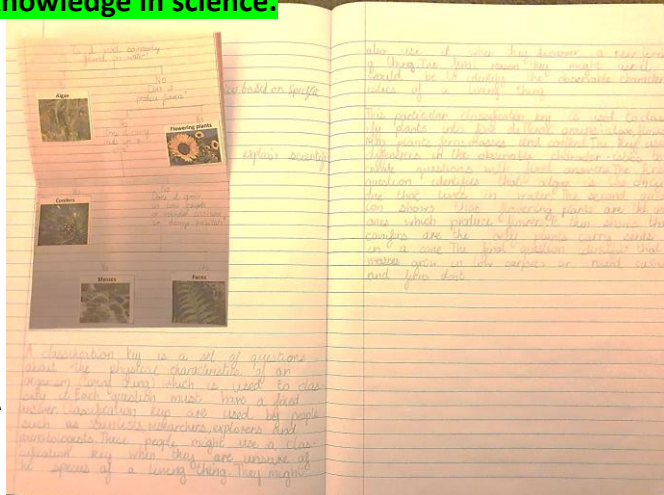


Impact: The year 6 group who completed the project developed their skills of analysing texts.

Impact: As we get to keep the books and have been doing the project for 4 years now, children in most classrooms have access to high quality science literature.

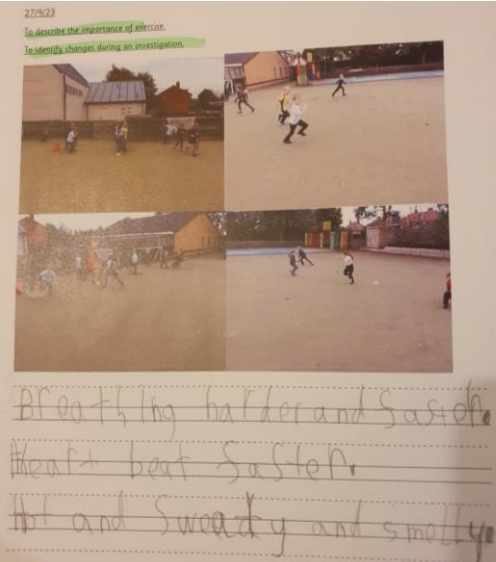
Key need: Make cross-curricular links to and within science.

Impact: Work analysis shows children across school now learn to communicate like scientists by applying their writing and grammar knowledge in science.



4. WRITING: Build a cross-curricular piece of writing into each unit of work.

3. PE: Use scientific reasoning in PE lessons.



Impact: Lesson observations in PE show children now learn to speak like scientists by explaining their knowledge in PE lessons.

Impact: Work analysis demonstrates children now learn to record in scientific ways by using data recording skills such as create tables, charts and graph skills. This is planned into the curriculum at the same time as they would study statistics in maths.

1. Our school log of STEM ambassador sessions both online and in school.

NAME	TYPE	OWNER	LOCATION NAME	LOCATION POSTCODE
Digestive System - exploring the way our body works	Interactive classroom session	Brown Corinna	ONLINE	
Light up Our Topic-Interactive talk and/or practical activity around the topic of light for Y5/Y6 (In person or Online)	Interactive classroom session	Brown Corinna		
Rocks! Rocks! Glorious Rocks!	STEM Presentation / Q&A	Brown Corinna		
Human Bones and Muscles	STEM Presentation / Q&A	Brown Corinna	ONLINE	
Roman aqueducts or roads!	STEM Presentation / Q&A	Brown Corinna	ONLINE	
Evolution and Inheritance - Vikings!	STEM Presentation / Q&A	Brown Corinna	ONLINE	

NAME	TYPE	OWNER	LOCATION NAME	LOCATION POSTCODE
ECO - Impact of our actions on the climate and planet	STEM Presentation / Q&A	Brown Corinna	ONLINE	
Geography! Or Geology!	STEM Presentation / Q&A	Brown Corinna	ONLINE	
Living things and their habitats	STEM Presentation / Q&A	Brown Corinna	ONLINE	
Around the World!	STEM Presentation / Q&A	Brown Corinna	ONLINE	
Science Week	STEM workshop / practical activity	Brown Corinna		

Impact: Children have experienced a range of workshops delivered by scientists and scientific experts, which helps to further their subject knowledge and inspire them to become life-long scientific learners.

Key need: Develop links with the STEM external organisation.

STEM LEARNING

PrimarySecondaryPost-16EmployersSTEM Amba:

My CPD

Current CPD activities

No active courses

Past CPD activities (1)

4. Staff members were provided with access to STEM CPD.

Impact: Staff develop up-to-date knowledge about the science curriculum, which they can then implement into their practice.

2. A sample of photos showing children across school engaging with STEM ambassador lead workshops.



3. Pupil voice quotes following a STEM ambassador visit.

'We met a real scientist. [...] Did you know that opaque objects make shadows. [...] I only thought scientists worked in a lab.' – AD (year 3 child)

Impact: Children are inspired by their experiences and develop their knowledge further.

1. An example of one of our whole school eco-displays.



Impact: Children are encouraged to join and participant in eco-club across school. Children to adopt eco-friendly behaviours.

2. Photos of eco-club taking place during school.

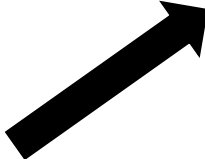


Impact: Children learn about the environment and natural world around them. They develop an enthusiasm about caring for the natural world.

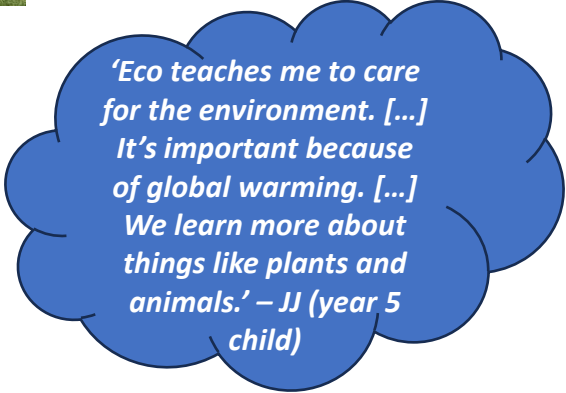


Key need: Extend opportunities for Eco-club and develop into an after-school club.

4. Photos from eco after school club trip to a local allotment.



5. Pupil voice quote.



Impact: Children extend and apply their knowledge from national curriculum content.



Impact: Children learn about the environment, and how to use a range of tools and scientific equipment.



3. Photos from eco after school club, which takes place every Wednesday.

