How GSSfS empowered young investigators • Science shared, stories told

PRIMARY SCIENCE

Great Science Share for SCHOOLS

ASE'S JOURNAL FOR PRIMARY SCIENCE

Special Issue

Great Science Share for Schools: Anniversary Issue

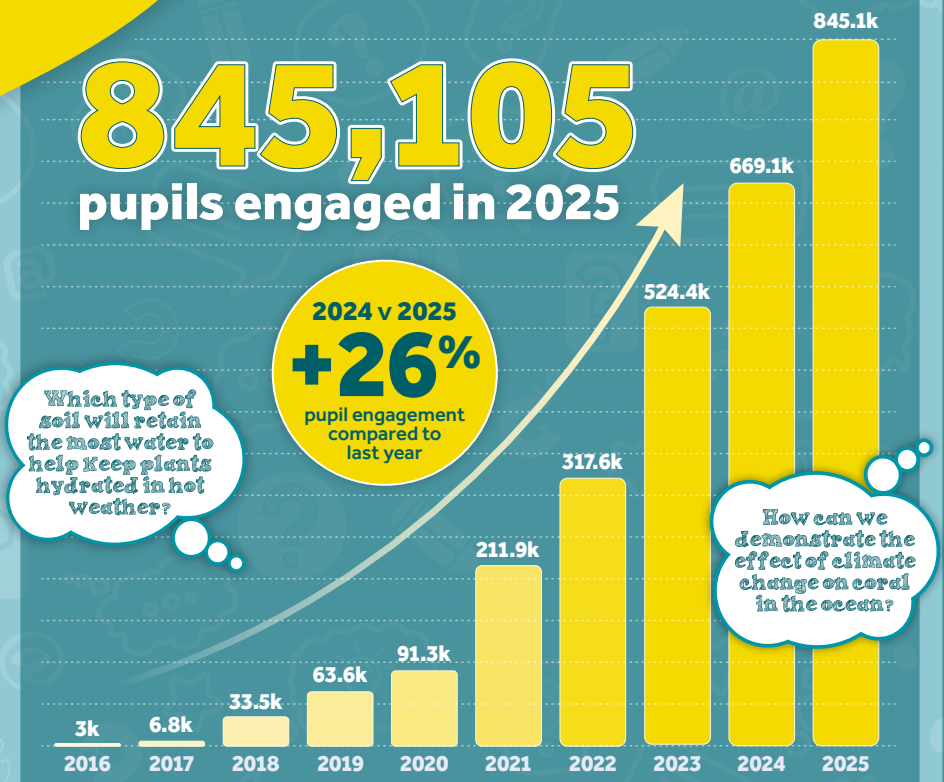
ASSOCIATION FOR SCIENCE EDUCATION

Great Science Share for SCHOOLS

Great Science Share 2025 IN NUMBERS

Inspiring 5-14 year olds to ask, investigate and share *their* scientific questions

845,105
pupils engaged in 2025



10 YEARS

Schools in **98%** of Local Authority Districts signed up

Participants in **52** countries*

*Argentina, Australia, Azerbaijan, Bangladesh, Belgium, Bosnia Herzegovina, Botswana, Brazil, Bulgaria, Canada, China, Colombia, Cuba, Cyprus, Denmark, England, France, Germany, Greece, Hungary, India, Ireland, Italy, Lithuania, Malaysia, Malta, Mexico, Montenegro, Netherlands, New Zealand, Nigeria, Northern Ireland, Norway, Pakistan, Panama, Peru, Philippines, Portugal, Qatar, Saudi Arabia, Scotland, South Africa, South Korea, Spain, Switzerland, Thailand, Turkey, United Arab Emirates, USA, Venezuela, Vietnam, Wales

Great Guided Enquiries

Modelling teaching & learning of working scientifically

Great Science Toolkit → **Translated into Spanish**

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Patronage 2025

Strategic partnership with Malta Ministry for Education

The Global Sustainable Development Goals

inspired young people around the world on the theme of 'Connected Science'

SUSTAINABLE DEVELOPMENT GOALS

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CREST AWARDS · BRITISH SCIENCE ASSOCIATION · I'm a Scientist Get me OUT of here · Royal Society of Biology · The Geological Society · THE ROYAL SOCIETY · Barefoot Computing at School

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PRIMARY SCIENCE

ASSOCIATION FOR SCIENCE EDUCATION

Primary Science is the primary journal of the ASE and is published three times a year. The ideas and opinions expressed in this journal are not necessarily those of the ASE.

Writing for *Primary Science*

Primary Science publishes articles on all aspects of primary science education, including early years, and we welcome articles that:

- support effective classroom practice in teaching, learning and assessing science;
- give practical classroom ideas;
- interpret (rather than simply present) research;
- address issues relating to primary science education;
- comment on controversial articles, issues and debates;
- challenge teachers' thinking about important changes.

Short contributions are very welcome, including notices, letters and short responses to other articles. It may help you if you read one or two articles in *Primary Science* before beginning your own.

The Editor is very happy to advise and support new authors.
Contact: **pseditor@ase.org.uk**

Detailed guidelines for writing for the journal are available on the ASE website:
www.ase.org.uk/submission-guidelines

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For more information about special issues of ASE journals, please contact Publications Coordinator, Will Hoole at **willhoole@ase.org.uk**

As GSSfS Director, Professor Lynne Bianchi, would like to acknowledge the dedication and commitment from everyone in the GSSfS community who has offered support in any way. Particular note to all supporters, advocates and funders, and the current campaign team that includes Grace Marson, Frances Hunt, Nicola Fletcher, Jo Montgomery, Kate Sutton, Liya Broadbent, Kate Goodier, David Xu and Eleanor Evans.

Great Science Share for SCHOOLS

GSSfS is delighted to have our impact recognised through:

- The Royal Society of Chemistry's Team Prize for Excellence in Primary Education Winner 2024
- Making a Difference Award for Social Responsibility 2018, 2017
- Chemical Industries North West Sustainability Award 2018
- National Chemical Industries Association Reputation Award 2018

Health & Safety

Reasonable care has been taken to ensure that articles in this journal do not suggest practices that might be dangerous, and safety warnings are given where appropriate. However, the ASE has not tested the activities suggested and can therefore give no guarantee of safety. For further advice on health and safety matters in primary science education see *Be safe! Health and safety in school science and technology for teachers of 3- to 12-year-olds* (4th edition, ASE, 2011).

Editorial

A decade has passed since this fast-moving campaign came into being, and five years since the first ASE *Primary Science* Special Edition dedicated to its impact. Here we are, back with this bumper issue, which tells of many different science shares, in different spaces, accommodating many different types of pupils. Underpinning each are the core values of inclusion, collaboration and learner-centred science learning.

I'd like to acknowledge and thank the Association for Science Education for their willingness to support us in publishing again, in this journal that is so fitting to represent teacher and educator voices about 'what works' when the campaign is adopted into schools.

What you'll notice across the 11 articles is a recognition of the need to upskill and support teachers first and foremost in their awareness of high-quality working scientifically pedagogy. The opening up and delving deeper into how to support pupils to ask, investigate and share scientific questions is what GSSfS has become renowned for. Not just in England either – now with reach into 52 countries and strategic work with ministries of education in Europe, we find ourselves pushing a global drive to enhance practical work and real-world experiences for young people.

Place-based approaches flavour these articles, and you'll read of garden-based learning with the RHS, hospital school learning, home-school learning and science sharing that simply has few boundaries in terms of where it happens. The joy of science enquiry and the wonder of asking and exploring questions leaps off the pages with many explaining how GSSfS can provide an opportunity to practise scientific vocabulary, develop oracy, teamwork and critical thinking.

What you'll read about delivers impact. Rigorous evaluation has shown that pupils participating in GSSfS gain statistically significant advantages in their personal resilience and metacognition. Modest but consistent advantages throughout all 12 metacognition items, including greater perceived autonomy, intrinsic motivation, and use of reflexive and creative learning strategies, are things to really celebrate.

Greater pupil curiosity and GSSfS pupils expressing stronger engagement with science and personal interest-driven learning are things that we should all be proud of, gaining greater equity as no significant differences across gender or socioeconomic groups are found.

Enjoy the read, feel the impact, feel the joy, and most of all keep sharing!

Professor Lynne Bianchi, GSSfS Founder & Director
Vice Dean SREDIA, The University of Manchester

We don't have any nature in our school... or do we?

Simon Colderley and **Jenny Lobo,** from the National Education Nature Park, reflect on hosting their first GSSfS share event within a botanic garden run by the Royal Horticultural Society. They review the experience and activities that inspired teachers and pupils to connect to their local nature and develop fundamental close observation skills as part of scientific enquiry.

Ask your class about the nature in your school. What answers do you get? Nothing? Seagulls? Spiders? Dandelions? The neighbourhood cat? The chances are that some pupils in your class might not have noticed or thought about other aspects of nature in your school grounds. The truth is, we can all be a bit 'blind' to nature and may feel that it is something separate from our lives. The reality is that we are all part of nature, and our school grounds hold a unique mix of habitats and biodiversity, which we should be proud of.

Even in schools with only a small outdoor space, there is biodiversity ready to be explored! In our work, we recognise how school sites hold exciting potential for pupil-led scientific enquiry and collaboration, as well as opportunities to share experiences, knowledge and observations with each other.

Why is involving pupils in exploring nature and biodiversity in their schools important?

Since the 1970s, the UK, like many countries across the world, has seen a decline in biodiversity and nature. The UK is now one of the most nature-depleted countries in the world. Nationally, we have seen an 18% decline in pollinators such as bees, hoverflies and moths. Across the country, there has been declines in different species. For example, in Greater Manchester there has been a 24% decline in hedgehogs since 1995, while in Surrey there has been a 51% decline in ground beetles - an important predator in the food chains of gardens, woodlands and meadow habitats.

But it's not all doom and gloom! Organisations, local authorities, individuals and the government are coming together to support biodiversity to recover and thrive. For example, conservation management has supported the population of Natterjack Toads to stabilise and expand in specific areas. In England, the Environment Act 2021 commits to conserve at least 30% of land and sea for biodiversity by 2030 and across the country

The National Education Nature Park is an England-wide programme which helps young people to connect to nature through exploring their local environment, providing the opportunity for pupils to take hands-on action to improve biodiversity and tackle climate change. By the end of the 2024-25 academic year, over 7,500 schools (NENP annual report, 2025) in England had joined the Nature Park and have collectively worked together to map 13 million square metres of habitats, 75km of hedges and 865 bird boxes, as well as over 940 individual trees and 74 log piles. Using free tools and resources, teachers and pupils have collected data that led to this huge achievement, marking a significant change from October 2023 when there was little understanding of the biodiversity present in England's school grounds.

The Nature Park can support pupils to spark their curiosity and ask scientific questions about local nature.

plans are being made to support nature to recover. So, what can we do in schools to help?

The school grounds of primary and secondary schools in England make up a large proportion of the natural ecology; however, they are rarely or never included in national ecology surveys. As a result, little is known about the biodiversity and nature hidden in schools!

Since September 2024, there has been an increased emphasis on schools in England to develop a Climate Action Plan. This raises the profile of sustainability and inspires us to find ways that pupils can drive forward actions for biodiversity by themselves, dovetailing really well with the development of their scientific skills. Scientists and ecologists don't know what habitats are on your school site, and they don't know about the species that call your school home. By encouraging teachers and pupils to explore the biodiversity on school sites and then submit their findings through community science projects, we can help to monitor biodiversity, contributing to an increase in knowledge about how nature is adapting to a changing climate.

Using GSSfS to structure first steps for pupils to explore the biodiversity in their school

Getting started

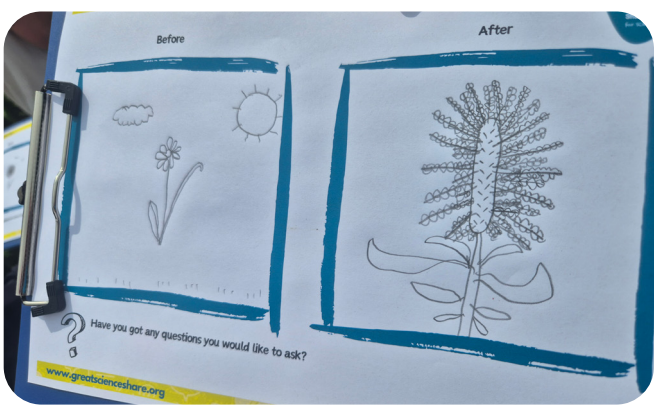
Hosting our first GSSfS event with five local primary schools at RHS Garden Bridgewater enabled us to bring GSSfS and Nature Park activities together. Pupils shared their scientific questions and investigations, and took part in activities to spark curiosity, enquiry, discovery which also provided an opportunity to share experiences.

One such activity was the Nature Park *Sound Mapping* activity. Sound Mapping sparks a curiosity in the local environment by providing time to notice and observe, as well as the opportunity to connect with nature to support wellbeing. This short activity challenged pupils to listen for five minutes and record their observations. At the GSSfS event, pupils heard crickets, bees and different bird songs; they noticed the wind in the trees and the tall grass around them, as well as picking up on distant sounds of talking and cars. These observations started conversations about their surrounding environment and sparked curiosity – one pupil commented, '*I heard a bird, I wonder what it is?*'.

The *Great Observation Share* from GSSfS inspires pupils to explore biodiversity and life on land by developing the scientific skill of close observational drawing. Using scientific equipment including hand lenses, magnifiers and microscopes, pupils explore the fascinating features of plants, insects and leaf structures. This activity challenged pupils to take a closer, more 'scientific' look at plants. When observing cornflowers, marigolds and harebells, pupils used hand lenses to note shape, colour, size and patterns, and they took time to create accurate botanical drawings. As pupils were making their observations, they were asking questions about why the same type of plants had different coloured flowers and were interested in the pollinators which were visiting their flowers. This guided enquiry worked well as a first step to exploring plant biodiversity, as it provided inspiration and tools for pupils to notice and be curious about the nature which they were observing.

Next steps – going beyond observation to authentic data collection

Once your pupils have started observing biodiversity, progression and challenge can be provided through opportunities to collect and interpret data – and it can be as easy as counting pollinators or recording species on the playground!



The Nature Park's *Pollinator Count* activity is a great next step. It includes scaffolded resources designed specifically for pupils to submit data via the Nature Park, which is then added to the bigger picture of the biodiversity data collected on a school site.

During GSSfS 2025, 16 schools took part in the first year of the Nature Park's Pollinator Count activity – between the schools they completed 61 pollinator counts and recorded: 141 tiny insects; 127 bees, flies and wasps; 72 bumblebees; 10 butterflies and 48 other insects. These observations of pollinators fed into the FIT Count, a national community science project focused on monitoring pollinators. Pupils used the data they'd collected to compare findings to work out the best flowers for specific types of insect, and could use these results to help them to select the plants they would like to have more of within the school.

Another option for collecting biodiversity data, leading to scientific question asking, is *BioBlitz*, where pupils collaborate in recording as many species as possible in a short amount of time. The City Nature Challenge is a global *BioBlitz* event and uses *iNaturalist*. This is a way for schools to create a biodiversity baseline as you contribute to a global citizen science project. The data your pupils collect via *iNaturalist* or the City Nature Challenge is visualised on an aerial map of your school which can be downloaded and used to create graphs or charts from which authentic data analysis and conclusion building can take place. Biodiversity bar charts offers opportunities for pupils to interpret and identify trends and opportunities for further enquiry by using coloured cards to visualise species data. We found this to be a powerful way of working with 9–10-year-olds using their bar charts to identify the lack of, and therefore opportunity to add, a pond in their school as a habitat to support dragonflies.

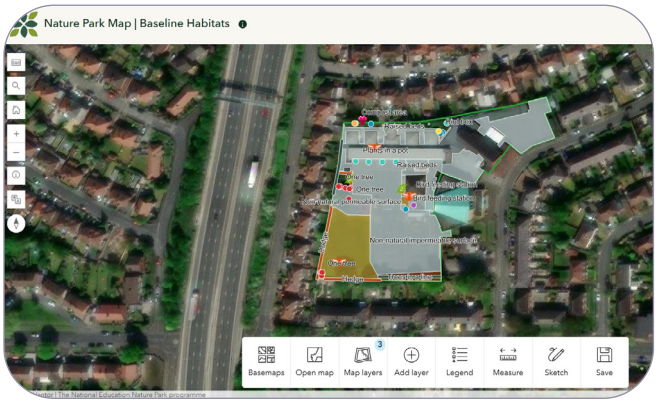


Image credit: St Hugh of Lincoln RC Primary School, Manchester

Time for you to take the next step into asking scientific questions about biodiversity in your schools

Every school has nature to explore – from dandelions growing along the edge of the playground to bumblebees visiting in early spring in search of nectar. The Nature Park's activities brought together within the framework of the GSSfS campaign inspired pupils to ask, investigate and share scientific questions outdoors, closely observing and noticing nature together.

By joining forces, both Great Science Share for Schools and National Education Nature Park were better off for it – there were authentic parallel goals related to inclusion and collaboration and a core purpose of improving young people's understanding of the world around them.

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Honing higher-order thinking skills with GSSfS

Francesca MacLennan reflects on the Science Oxford Big Science Event run in collaboration with Great Science Share for Schools and how these are platforms to springboard pupils' thinking skills in science

Image showing pupils and teachers in the Oxfordshire share

Young scientists shine at the Big Science Event 2025

Science Oxford's Big Science Event joined forces with Great Science Share for Schools, showing true collaborative spirit focused on a shared mission to inspire and support pupil-led scientific enquiry. Science Oxford's programme had been running since 2010 and encouraged 5–11-year-olds to ask curious questions, conduct practical scientific investigations and sharing of findings in a competition-style approach. Both organisations knew the synergy was too close not to take the next step.

Joining with the national initiative brought two organisations with shared values and goals together to further their aims of optimising science education in the UK and engaging as many pupils and teachers as possible.

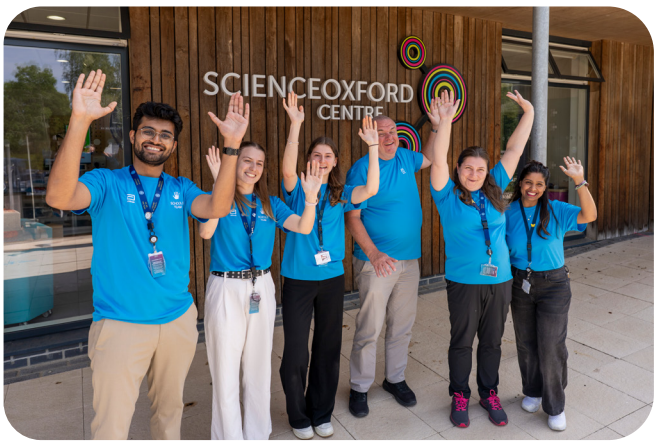
Schools entered a ballot for a place at the Science Oxford Science Share event held on 17th June 2025, as spaces were limited. Following a Great Science Share approach, 13 schools brought teams of six pupils to share their science with peers and take part in a pond dipping workshop as well as spend time in the Science Oxford Centre 'hands-on' Exploration Zone.

Pupils demonstrated their abundant curiosity about the world around them, and shared how they found answers as a team to interesting scientific questions, including:

- What surface does a woodlouse find it easiest to walk on?
- Which suncream provides the best protection against The Sun's rays?

100 schools in Oxfordshire and Buckinghamshire took part

22,200 pupils engaged



- Which material will make the parachute fall the slowest?
- Do people with longer femurs jump further?
- Do magnets still attract in different liquids?
- How do rubber bands effect the shape and strength of a watermelon?

To support the application of Thinking, Doing, Talking Science in the region, members of the Science Oxford team were STEM Champions and visited science sharing events that were held in local primary schools. They asked curious questions and celebrated the science that was being undertaken, becoming part of the audience giving pupils the opportunity to talk about their investigations with peers, parents, teachers, governors and a range of guests working in science, technology, engineering and maths.

Local industry volunteers from Diamond Light Source and Abbott also developed posters to share their

Science Oxford is the UK's first indoor outdoor science centre with 15 acres of woodland.

They are part of The Association for Science and Discovery Centres (ASDC) in the UK and The European Network of Science Centres and Museums (Ecsite) covers Europe. Find your nearest science centre here: www.sciencecentres.org.uk/

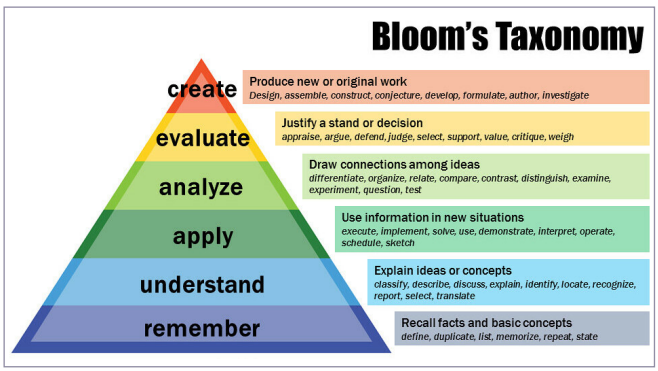
own investigation questions, including '*Why does chocolate taste different after it has melted*' and '*How much sugar is contained in different foods?*'. The involvement of adults in the share showed connectivity between pupil and adult curiosity and gave direct links with local STEM organisations who could show real-world applications for the science learnt in schools.

Working the Great Science Share to improve children's higher order thinking skills (HOTS)

We knew that we wanted to ensure the impact of this initiative gave as many learning benefits to pupils as possible. We considered the ways in which we would be able to foster curiosity, enhance problem solving skills, increase oracy as well as advance analysis, evaluation and creative abilities. At Science Oxford, our research-based *Thinking, Doing, Talking Science* pedagogy co-created with Oxford Brookes University, demonstrates how fundamental these abilities are to pupils' learning, moving it beyond knowledge acquisition and recall through rote learning. In this way, we considered how GSSfS could strengthen pupils' higher order thinking.

> *'Higher order thinking occurs when a person takes new information and information stored in memory and interrelates and/or rearranges and extends this information to achieve a purpose or find possible answers in perplexing situations.'* Lewis and Smith 1993

The well-known Bloom's Taxonomy (Bloom 1956) defines the highest order thinking as involving the complex tasks of making a new creation based on prior knowledge. We acknowledge that since its initial development in the 1950s, Bloom's Taxonomy has received academic review, that highlights its benefits and limitations to learning.



Tidema (2024)

The *Thinking, Doing, Talking Science* pedagogy was co-created by Science Oxford and Oxford Brookes University in 2012 and has been proven to:

- build teacher confidence
- promote higher-order thinking skills
- allow greater time for practicals
- increase enjoyment
- foster more positive attitudes towards science

(Education Endowment Foundation 2025)

At the heart of this approach is the concept of extending children's thinking in science by encouraging higher-order thinking skills, with every science lesson including a dedicated time for thinking and talking, called the '*Bright Ideas Time*'. Here, all ideas are valued, enabling a safe space where taking risks holds greater importance than finding the 'correct' answer.

To find out more about the *Thinking, Doing, Talking Science* pedagogy visit: https://tdtscience.org.uk

We were keen to ensure that pupils moved beyond remembering and reciting facts, to being able to summarise them, and draw conclusions as well as potentially applying findings to other situations. For science learning overall, we sought to promote more freedom for pupils and teachers alike, by modelling that they did not need to strive for perfection in answering every question 'correctly'. We sought to demonstrate how important it was to discuss, question and explore concepts that are new or beyond what has been considered or encountered before.

'I really liked the way science is very free and you can do anything. Science is so vast you can go from chemistry to biology, looking at little insects to studying the heart. It's really vast.'

Using *Thinking, Doing, Talking Science* to enhance your GSSfS

A key element of the *Thinking, Doing, Talking Science* best practice pedagogy is '*Bright Ideas Time*'. Working with the Science Oxford team, GSSfS has already embedded the Big Question idea into the range of *Question Ponders*, aligned to the *Great Science Enquiries*. Other ways that teachers can support pupils to develop higher-order thinking comes through the *Bright Ideas Time* approaches. These are dedicated discussion slots during science lessons, which inspire thinking and talking where all ideas and responses are valued. The following strategies can be used to promote higher-order thinking:

- **Odd One Out:** present pupils with 3–4 items and ask them to choose and justify what makes them the 'Odd One Out'. An example is water, chocolate and paper. Praising the thinking is the key here, rather than looking for a 'right' answer and multiple answers can be elicited.
- **Positive, Minus, Interesting (PMI):** pose a question such as, '*What would be the positives, minuses and interesting points if we had a world without electricity?*'
- **HOT questions:** such as, '*How do we know that the Earth is a sphere?*'

The other great way that *Thinking, Doing, Talking Science* has been infused into GSSfS is through the links with the STEM Learning *Explorify* resources. These are well-recognised resources and include '*Bright Ideas Time*' activities, providing teachers with a myriad of activities themed to all areas of the curriculum. This means that whichever scientific questions your pupils are asking, investigating and sharing, there will likely be an *Explorify* resource to inspire and match in with it. These are inclusive and can be readily used in your science lessons on a regular basis to promote higher-order thinking skills.

Great Question Ponders

Great Question Ponders are a discussion-based activity that brought together *Thinking, Doing, Talking Science* and created a talk tool called the *Great Question Ponder Prompts* using Huthwaite International's verbal behaviour strategies. Together these encourage pupils of all ages to explore big questions and share their thoughts and opinions in a collaborative setting.

Each ponder links to a *Great Guided Enquiry* (published each year) often connecting to themes of sustainability and global issues. The Prompts help pupils enhance their group discussions by using a range of verbal behaviours such as supporting ideas, disagreeing respectfully, summarising, clarifying understanding, sharing information and asking thoughtful questions.

These prompts not only deepen scientific thinking but also help pupils uncover and examine common misconceptions. In today's world, developing the ability to think critically and question information is more important than ever. The *Great Question Ponder* supports this by fostering thoughtful, evidence-based dialogue among young learners.

To explore the *Question Ponders* in more detail, visit: www.greatscienceshare.org/gssfs-resource-library-2023/questionponder-2025.

Impact

Empowering young people to pursue pupil-led enquiry and share their science provides rich rewards.

> *'You could see the children are passionate about everything they talked about and their experiments, and they were ready to share with others. The children have learned a lot today and they will take this back to their school to share with others.'* Teacher

> *'It is incredibly heartening to see so many primary-aged pupils deeply engaged in asking their own scientific questions, conducting investigations and then sharing their findings with others. This is at a time where UK STEM talent needs are ever-rising, as we seek to find pioneering solutions to global challenges such as climate change, electrification, global health and embrace the new era of digital technologies and AI. Inspiring the next generation about science and engineering careers in these formative years and fostering curiosity is paramount.'* Francesca MacLennan, Director of Science Education and Engagement

Summary

The Big Science Event and Great Science Share for Schools provide creative frameworks and the scaffolding to apply the *Thinking, Doing, Talking Science* pedagogy in the classroom and beyond, resulting in the development of higher-order thinking skills and rich science learning. This approach develops cognitively challenging, practical and interactive primary science.

The benefits are widely acknowledged by teachers and pupils alike with increased confidence, enhanced oracy skills and purposeful practical science among the added benefits.

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Pupils take the lead!

Hayley Sherrard, SSERC, and **Joanne Jarvie,** a teacher at Thornton Primary School, review the impact of a series of learner-led science lessons which were presented 'live' to pupils across Scotland as part of the GSSfS campaign

Peer-led learning has proven to be a successful model for sharing great science across Scottish schools

As Great Science Share for Schools celebrates its 10th year, coinciding with the Scottish Schools Education Research Centre (SSERC)'s 60th anniversary, it seems the perfect time to reflect on the success of the 'live lesson' model that SSERC has developed in support of GSSfS. This article reflects on the benefits of pupil-led learning in primary science and aims to encourage practitioners to consider implementing this approach in the future.

Building on track record

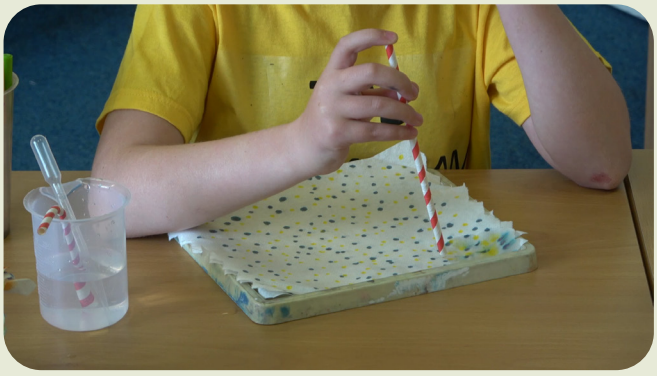
In addition to their STEM Advisory service in Scotland, SSERC has been providing online interactive professional learning for over 15 years. This well-established model offers practitioners access to a mix of guided science investigations, activities and discussions, taking part alongside colleagues from across Scotland in real time. Evaluations show that 97% of participants rate the professional impact of these live 'SSERC Meets' as either 'excellent' or 'very good'. So, it made sense for us to utilise this model and extend it, to enable pupils to share their Great Science Share questions and investigations with their peers across Scotland using the 'live lesson' approach!

Aligning the SSERC Live Lessons with GSSfS values

Keeping in mind that GSSfS aims to develop pupils' curiosity, scientific questioning and a wide range of skills associated with working scientifically, we sought to co-create an impactful experience and approached pupils at Thornton Primary School in Fife to decide on the theme that they were interested in.

The school has a thriving pupil STEAM Team made up of 10–12-year-olds, led by Joanne Jarvie, who holds a Primary Science Teaching Trust 'Teacher of the Year' fellowship. Enthusiasm was immediate as the pupils leapt at the opportunity to appear live on screen, sharing practical activities and explaining science concepts to other pupils; a prospect that even some adults might find daunting!

The team were tasked with devising practical science investigations that would require minimum resources, be easy to prepare and appeal to a range of age groups. It was important that the pupils were able to explain the science, as well as inspiring all pupils



A member of the STEAM Team demonstrates how to use a paper straw as a pipette

taking part to devise their own investigations and carry on after the live lesson had finished.

Enhancing oracy and scientific literacy for those delivering and those gaining from the live lesson

A recent review, commissioned by the Royal Society on scientific literacy and oracy in primary education (Earle, *et al*, 2025) identified oracy as a core element of scientific literacy, citing it as a crucial means to support the development of scientific understanding and reasoning.

Active participation in dialogue about science ideas and practical applications helps children to engage with science-related issues, communicate their findings and develop an understanding of science as a discipline. '*Articulating ideas, developing understanding and engaging with others through speaking, listening and communication*' Oracy Education Commission, 2024.

The live lesson model sought to develop oracy and aligned strongly with the following definition proposed by the Royal Society: *Scientific literacy for primary-aged children involves purposeful and active engagement with science ideas and real-world contexts, to discuss and apply scientific thinking.*

Multiple investigation options allow for choice and autonomy

After some lively discussion, it was decided that the live lesson would focus on paper, water and ink. The key was to find activities that were easy to resource for schools and simple to set up, yet rich in terms of potential investigation ideas for pupils to investigate after the live lesson. The team were keen to profile a paper flower investigation in which pupils cut out a flower shape from a piece of paper, fold the petals into the centre and place the folded flower in a tray or bowl of water. As water is absorbed by the fibres in the paper the petals start to open.

Multiple questions and investigations can stem from this activity, giving pupils choice and a sense of autonomy when deciding on their approach. Alternative independent variables are feasible ways to keep groups on the same topic, but also allow a sense of independence, e.g. the type of paper used (card, tissue, etc.) or the size of the flower, or the volume or temperature of the water. Pupils could also be asked to consider what they would measure during the investigation (the dependent variable), in this case, the time taken for the flowers to open.

The teams came up with a range of questions that could be investigated:

Do smaller flowers open faster than larger flowers?

Does the type of paper used affect the rate at which the flower opens?

How does the temperature of the water affect the time it takes for the flowers to open?

Do the flowers with the fewest petals open the fastest?

The STEAM Team also considered investigations they had enjoyed taking part during the school year involving chromatography, where they explored the soluble components of inks, using paper, ink and water. These activities lead to the separation of the different colours of ink that are often mixed together in felt-tip pens.

The STEAM Team asked pupils to help them answer the following questions:

Are all black inks made of the same mix of colours?

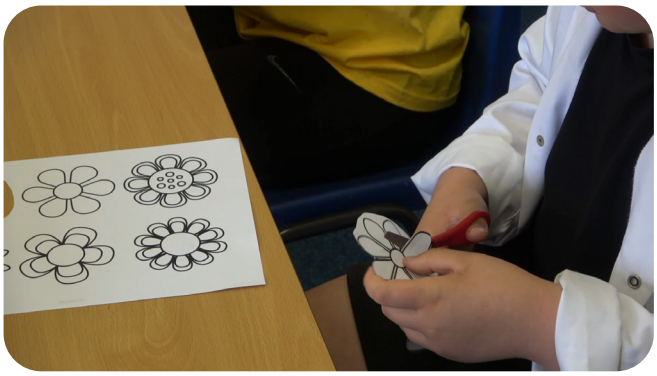
Which coloured inks travel the furthest and why?

Are all inks soluble in water?

How does the type of water affect the time taken for the colours spread out?

Listening to the pupils talk about these activities with such enthusiasm, it was clear that we had the basis for our live lesson. The next step was to make short films of four different investigations, this involved putting together storyboards and scripts, rehearsing and carrying out the activities in front of the camera. SSERC has access to specialist recording equipment,

The Great Science Share live lesson draws to a close, encouraging further investigations



Close-up videos demonstrate how to carry out the investigations

The Thornton Primary STEAM Team preparing the paper flowers

but similar films could easily be made using a tablet or similar device.

Sharing the science!

Giving focus to the pupils' explanations of the scientific processes and concepts as well as demonstrating how to carry out practical work in real time was vital. The STEAM Team gave the pupils who were watching lots of ideas for further investigations and made sure that their presentation would support and inspire others to take part in GSSfS after taking the main live lesson.

The STEAM Team carried out the activities in real time alongside the participants

Going live

Over 115 schools, ranging from locations in the Scottish Borders, to the Highlands and Aberdeen signed up to take part using a *Microsoft Forms* online booking system. Once schools had confirmed their place SSERC shared the Teams link and supporting materials, including details of the activities and a list of the resources required.

Four excited and enthusiastic presenters arrived at SSERC Headquarters on Tuesday 17th June ready for final preparations before the lesson went live at 11:30am. Pupils from 80 schools took part in the hour-long session presented entirely by the members of the STEAM Team.

The participating schools were not visible on screen but all schools communicated via the *Microsoft Teams Chat*, asking questions and sharing updates on what was happening in their school. Some schools also shared their progress via social media.

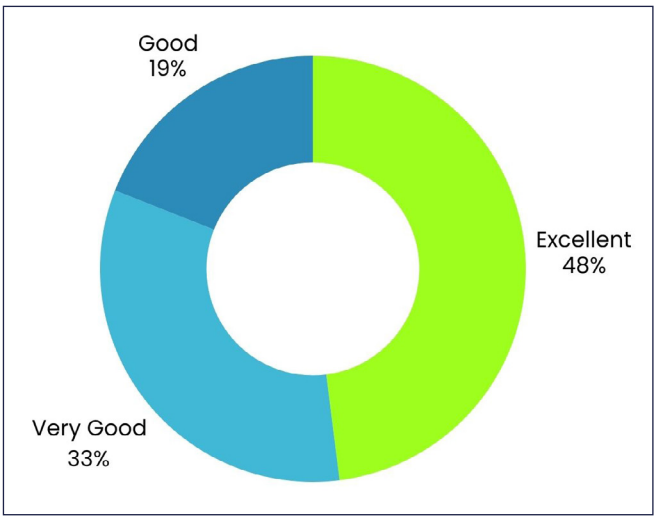
Making an impact

Teachers were asked to collate feedback from their classes and to provide the STEAM Team with their feedback evaluation of the session. We also asked if the

pupils had carried on with the science investigations after the live lesson had finished. 34% of schools responded, reporting that a total of 694 pupils took part in the live lesson, an average of 26 pupils per school.

The evaluation also showed that classes across the primary age range (Primary 1 – Primary 7) took part in the live lesson, with some older children working with younger ones.

How did the pupils rate the live lesson*?



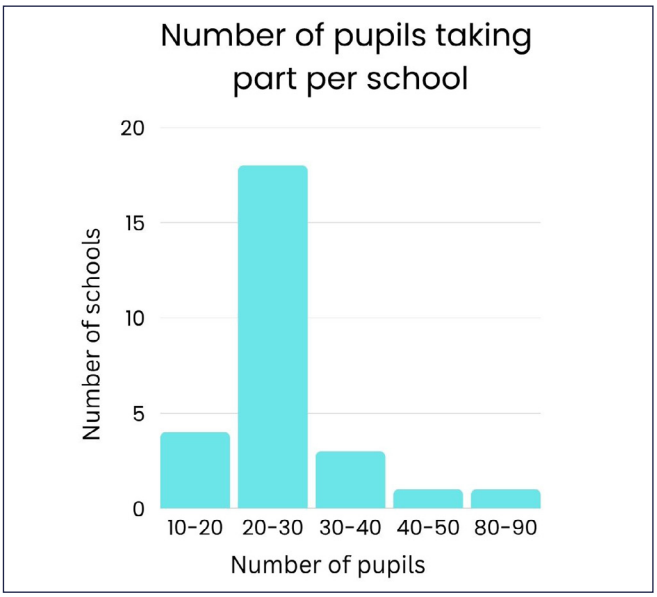
*Pupils were offered a choice of Excellent, Very Good, Good, Okay, Not Very Good

What pupils and teachers thought of the science live lesson...

- *A good interactive lesson which encouraged many scientific questions.*
- *We got to find out about science. We got to do it, not just watch it.*
- *The class really enjoyed the different activities. Lots of discussions around science and observations about what was happening.*
- *We will be using the focus questions given to further our knowledge and deepen our thinking.*

What teachers thought about the peer-led approach to the lesson delivery...

- *It was a great lesson and I really enjoyed that it was run by children.*
- *Really good and well-paced – it was great to see young pupils leading it!*
- *The children presenting were excellent and very confident.*
- *The children were engaged and it was simple to set up.*
- *Children really enjoyed the other children leading the lesson.*



- *Some children would like to be the presenters in years to come!*
- *When I asked the children if they would like to do more stuff like that it was a resounding yes.*
- *Very informative and short enough to hold their attention. Good practical activities with easy resources to find.*

How people felt about the collaborative, multi-school approach...

- *I really enjoyed it. I knew the experiments, but the class enjoyed hearing from other children and feeling part of something bigger.*
- *I liked seeing the other schools taking part too.*
- *It's good doing things with other schools. It's pretty good and it's just fantastic!*
- *The children would like to do more lessons like this.*

How accessible the live lesson content was considered to be...

- *We loved doing the experiments, we liked how easy the experiments were as everyone could do them.*
- *We really enjoyed it. We should do this more often!*
- *They loved the lesson as it was easy to set up!*
- *We enjoyed both tasks and enjoyed experimenting after.*

89% of schools said they would take part in a live lesson again and 100% reported that their pupils carried on with the science investigations after the live lesson, which is a fantastic outcome.

- *We experimented with different types of paper flower.*
- *We're going to try opening different flower shapes.*
- *They all want to try out different investigations on this.*

- *I'll reiterate the learning points, and we can complete the investigations/fair tests.*
- *Some of them have said they will try things out at home or during their playing time.*
- *We went on to carry out the flower experiment with different thicknesses of paper.*
- *They want to try it again with lots of variations!*

It was really inspiring to hear that **all** the pupils in the schools that submitted an evaluation were able to carry on with the science investigations after the live lesson. These evaluations go some way to support the conclusion that this peer-led model of sharing science meets the aims of Great Science Share for Schools, i.e. developing pupils' curiosity, scientific questioning and a wide range of skills associated with working scientifically.

Ideally, we would have liked a larger percentage of schools to have completed the evaluation, however the school term in Scotland finishes at the end of June and so it is understandable that completing the form may have had a lower priority at this stage in the school year.

Pupils as leaders of learning in science in Scotland

In May 2022 Scotland's *STEM Education and Training Strategy* was refreshed (Rajman *et al*, 2022). In this strategy, leadership in STEM was highlighted, recognising that, '*supporting effective leadership at all levels includes children and young people leading STEM learning.*'

Empowering young people to inspire, lead and mentor their peers through the delivery of STEM activities, events or interactions within their learning communities also underpins the Young STEM Leader Programme (YSLP) in Scotland (Scottish Government, 2022).

Inspiration for GSSfS in years to come

Since the Covid-19 pandemic there has been a huge increase in the use of technology to share ideas, and many teachers and pupils are more familiar than ever with this method of communicating their STEM learning with others.

We hope that settings across the globe will be inspired to use the model outlined in this article to enable pupils to share their ideas with others. We have shown that videos can be produced and shared easily across schools and clusters, enabling pupils on both sides of the screen to benefit. The way in which the event is delivered fits perfectly with GSSfS values of collaboration, learner-led and inclusive learning

SSERC is delighted to provide continuing support for Great Science Share for Schools and plans are already in the pipeline for more GSSfS Live Lessons. The STEAM Team at Thornton Primary have already been in touch with some ideas!

Videos of some of our GSSfS inspired lessons can be viewed via the SSERC TV YouTube channel: https://tinyurl.com/yyy6mrtq and https://tinyurl.com/y36kymaz

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How GSSfS Empowered Young Investigators

Isabel Zerafa and **Ingrid Bonello** describe Malta's vision for pupil-led, enquiry-based and inclusive science learning, linking with Great Science Share for Schools

STEM in Malta: a national priority

In today's rapidly evolving world, with global issues such as artificial intelligence, climate change, and space exploration amongst others, scientific literacy is not just important for aspiring scientists; it is foundational for every active citizen. STEM education equips pupils with the skills and mindsets they need to navigate complex challenges, solve real-world problems and actively contribute to society. In this context, it is highly important that education systems cultivate creativity, communication, collaboration and critical thinking – core 21st-century competencies (P21 Framework, 2009; OECD Policy Report, 2009; IEA 21st Century Skills Mapping Study, 2020).

In Malta, STEM education is recognised as a national priority (National Education Strategy 2024-2030, Ministry for Education, Sport, Youth, Research and Innovation, 2024). The Directorate for STEM & VET Programmes (DSVP), within the Ministry for Education, Sport, Youth, Research and Innovation (MEYR), is actively working to embed high-quality, equitable STEM learning across all educational levels. The Primary Science Team within DSVP mainly supports educators in the early and primary years (ages 3 to 11) by:

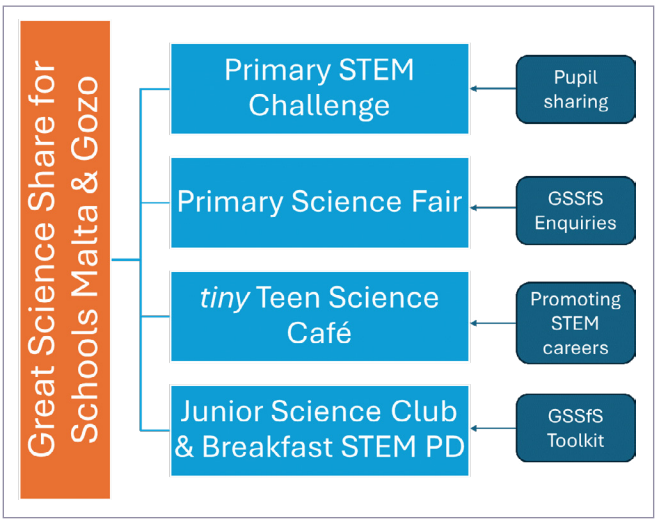
- designing and supporting the implementation of national curriculum programmes;
- offering professional development opportunities for educators;
- developing and promoting innovative STEM initiatives at the national, college, and school levels.

At the individual school level, there is an increasing emphasis on equipping teachers with resources and continuous professional learning to increasingly create hands-on, enquiry-based experiences for all their pupils. Chiswick House School has embraced this approach by consistently providing its teachers with access to national and international professional learning opportunities designed to deepen subject knowledge in science and enhance the application of effective teaching strategies. Pupils explore scientific phenomena through various hands-on activities, enquiry-based learning approaches, nature exploration, field work, making real-world connections and utilising technology within the classroom whenever possible.

A key initiative that is gaining momentum in Malta is Great Science Share for Schools (GSSfS). The success of this international campaign encourages young people to ask scientific questions that matter to them, investigate these questions, and share their findings. The GSSfS ethos complements Malta's strategic focus on pupil-led learning, inclusivity, and real-world relevance in STEM. Following the introduction of Professor Lynne Bianchi and the GSSfS initiative to Malta through strategic activities such as head teacher conferences and support teacher training, this article describes the experience of the authors as they inspired teachers and pupils to understand the features, advantages and benefits GSSfS could have to enhance the shift towards enquiry-based learning in primary science classrooms. Two levels of intervention were trialed – national and whole-school.

National level integration of GSSfS across the islands of Malta and Gozo

The diagram shows five national STEM initiatives and how GSSfS was integrated in the trial phase to support these distinct initiatives.



Embracing the sharing concept within the *Primary STEM Challenge*

The Primary Science Team within DSVP has been working consistently to foster scientific thinking among young learners and offer varied opportunities through national STEM initiatives. The *Primary STEM Challenge* is designed for pupils from age 7–11 years and aims to engage them and their teachers or parents/carers in doing practical science investigations. In its 6th edition, 60 primary pupils and 15 classroom teachers came together with their pupils inspired to create investigations based on one of three themes: nature, colours or sound.

All *Primary STEM Challenge* pupils were given the opportunity to present and share their investigations during the Primary Science Fair held at the Ministry's STEM & VET Curriculum Hub. Very much likened to a Great Science Share, here, pupils share their investigations with other pupils, teachers and parents. Pupils not only share findings, but notably develop valuable communication skills including explaining, reasoning and questioning. This experience is a great way to enable them to learn from each other and grow in self-esteem and self-confidence.

> *'It was truly heartwarming to see children learning and interacting so enthusiastically with one another.'* Parent

> *'What made it even more special was seeing my son confidently explaining his project and growing in self-assurance. A moment of pride and joy.'* Parent

Embracing the GSSfS Enquiries within the Primary Science Fair

In its first edition, the Primary Science Fair is an initiative for 9–10-year-old pupils across the island and is open to all schools. The adults offering the workshops include university outreach staff, specialist support teachers, and STEM industry colleagues.

This year, we took the opportunity to integrate two of the GSSfS Great Guided Enquiries, namely *Great Ocean Share* and *Great Electricity Share*, as ideal resources for adult-led workshops during the fair and made some adaptations to contextualise them to our Maltese setting and the fair's theme of Great Inventions: Bridging Science and Society. This meant that visiting pupils investigated the effect of oil spills on marine life and then went on to design their own invention after exploring past inventions and how these have improved life today.

> *'Thank you for the opportunity to engage with the pupils. I hope I managed to spark their curiosity about the ocean—it was a pleasure to share my passion with them. I really enjoyed the thoughtful questions they asked.'* Dr Anthony Galea, Department of Geosciences, University of Malta

Primary STEM Challenge participant discussing whether colour effects the rate of photosynthesis during the Primary Science Fair

Promoting STEM careers within the *tiny Teen Science Café*

Smart Pickings inspired the introductory presentation within another initiative within DSVP called the *tiny Teen Science Café*. This also comes to fruition within the Primary Science Fair and focuses on raising awareness of STEM careers.

We selected the biography of Ella Podmore, featured in the book, as a way to challenge gender stereotypes in STEM and to emphasise the message that anyone can be a scientist and do science anywhere!

Junior Science Club and *Breakfast STEM PD*

The *Junior Science Club* and *Breakfast STEM Professional Development* are two other national initiatives organised by the Primary Science team. Distinct in nature, both initiatives used the GSSfS Toolkit resources to encourage pupils and teachers to ask questions, make predictions and delve deeper into their enquiries.

GSSfS 'Prediction Prompts' were used by the educator-presenter during the *Junior Science Club* workshops held during the same Primary Science Fair. The prediction prompts guided pupils in making predictions when investigating themes such as camouflage, motion and electricity. This interdisciplinary approach helped pupils connect scientific enquiry with real-world impact, which is central to the ethos of GSSfS.

The *Breakfast STEM PD* brought together 150 educators and parents/guardians during professional development sessions held in various college clusters. Participants explored the theme 'weather' through interactive science and mathematics workshops. The GSSfS 'Question Teller' was used during the workshops to encourage participants to investigate phenomena such as rainbows, shadows, puddles and wind, further. Such tools sparked curiosity and prompted deeper questioning.

Whole-school level integration of GSSfS across Chiswick House School

This year the school hosted its second Great Science Share, with teachers and pupils from 3rd, 4th and 5th grades (7–10 years). The focus was to continue to enhance the school's commitment to transitioning from a dominant culture of teacher-led enquiry to more pupil-led/inspired enquiries, supported by teachers.

Junior Science Club presenter using the GSSfS 'Prediction Prompts' to help pupils develop their prediction

STEM educators presenting and referring to the GSSfS 'Question Teller' to encourage educators to delve deeper into their investigations during the Breakfast STEM PD workshops

The opportunity was open to all pupils as an optional and non-competitive enrichment activity. With a strap line of 'From Wonders to Investigations' pupils had been excitedly preparing for 10 weeks to come up with an investigation question and plan, which they would then work on and share with their peers in school in early May. This was a change to our first year and worked out to be even more liberating for the pupils, who had previously replicated an investigation they had already done in class. This year, teachers felt it worthwhile to give greater autonomy and choice – and the outcomes were truly 'great'!

During those preparatory weeks, teachers offered support during lunchtimes and dedicated 1.5 hours per week during our D.E.C. (Discover, Express, Create) lessons. Pupils were given the opportunity to work in their groups, whilst having their teacher present to guide as necessary. They researched, came up with a plan, shared roles and performed their investigation during this time. We also dedicated some time for pupils to design a poster to display during the share.

We kicked off this year's Great Science Share also with a special visit from science professionals who were from our parent body, who delivered engaging talks and hands-on workshops to our pupils. From exploring pressure in space and under the sea to tracing the journey of medicines through the human body, our pupils delved into a wide array of fascinating topics. They also took part in interactive games exploring chance and optimisation and learned more about the wonders of space science.

Held in the school hall, the CHS Great Science Share brought together pupils, who showcased their investigations and discoveries. The excitement filled a full school day dedicated to sharing the findings from the pupil-led work. Pupils had the opportunity

to visit each presentation, ask questions, and learn from their peers—celebrating curiosity, creativity, and collaboration in science.

What was the key change that took place in our practice?

The change from teacher-led to pupil-led enquiries required teachers to adapt their pedagogical approach. This year, pupils:

- were encouraged to 'own' each step of the scientific process, from producing their questions, forming their hypotheses, to designing and executing the investigations.
- were guided to find the materials they needed for the investigation themselves, rather than having them prepared by their teacher.
- used open-ended questioning to prompt deeper thinking and exploration.
- allowed greater flexibility in lesson planning to accommodate non-linear enquiry processes.
- offered targeted scaffolding, stepping in only when necessary.
- prioritised the assessment of scientific thinking and process over 'correct' outcomes.

We found that when teachers were moving towards pupil-led enquiry, it helped that they began with 'structured independence' supported by the teacher, and then to gradually increase the autonomy when pupils were more confident. While this approach required teachers to loosen control and allow for greater tolerance for uncertainty, it resulted in more meaningful engagement and the development of key scientific skills.

What outcomes did we observe?

It was truly rewarding that the number of pupils engaging in the science share doubled from the previous year and that they seemed to genuinely embrace questions that interested them, a few of which included:

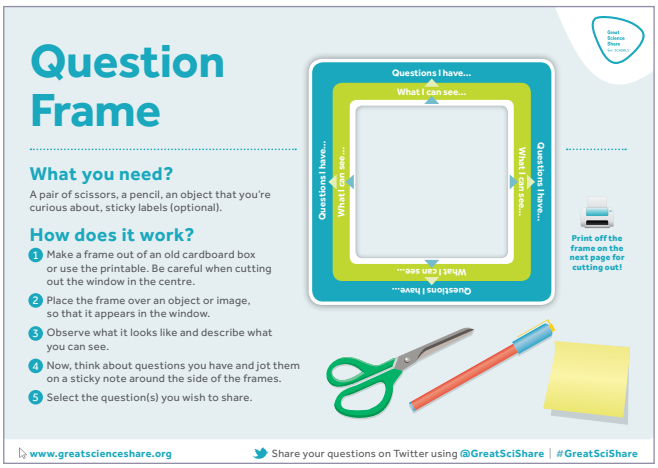
- Does the size of a marble affect how fast it rolls down?
- What is the effect of different beverages on your teeth?
- Does the type of shoe affect how fast I can run?
- Which type of chocolate melts the fastest?
- Do bath bombs dissolve quicker in hot or cold water?
- Which material is best for soundproofing?
- Does basil survive better in direct sunlight or in the shade?
- How do different items dissolve in water?

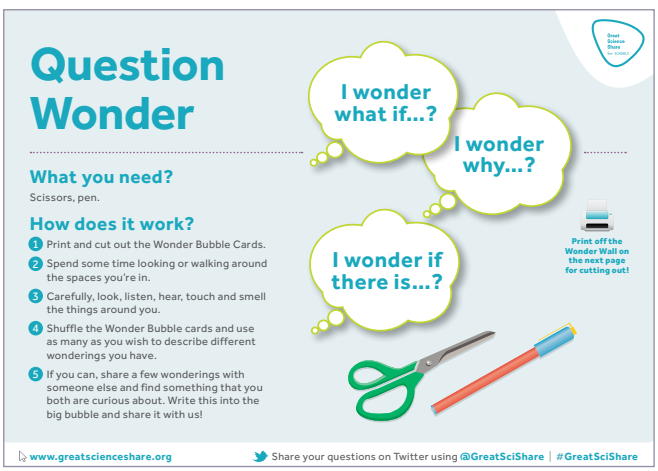
Pupils are naturally curious about the world around them, yet we noticed that they found difficulty independently developing their initial ideas into testable scientific questions and plans. To tackle this, we recognised that preparation was key, and we introduced all our teaching staff to the GSSfS Toolkit to support each aspect of the scientific method.

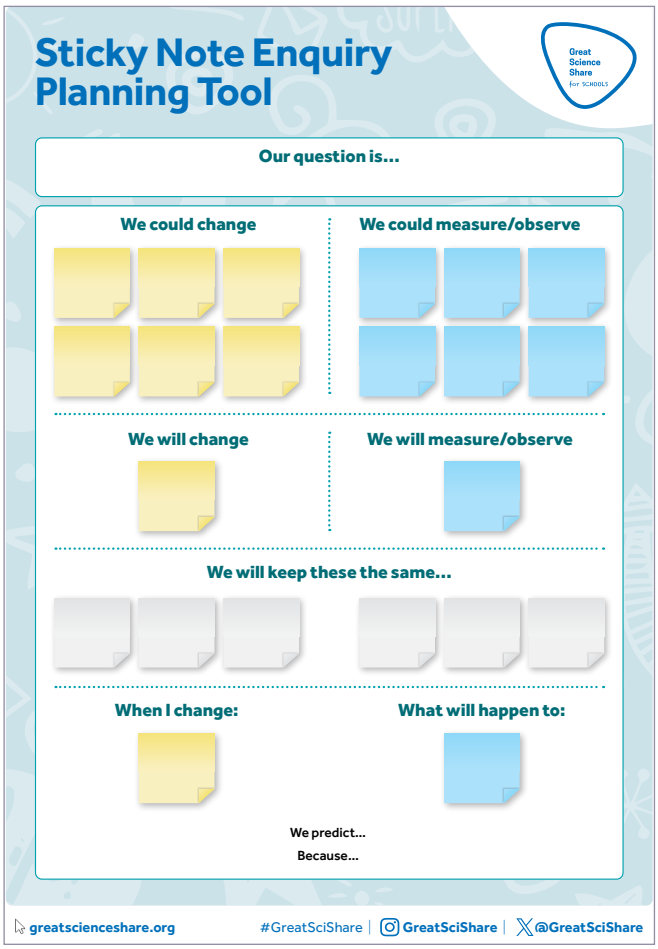
We prioritised scientific question-asking this year, using the *Question Makers* and particularly liked the *Question Frame* and *Question Wonder Cards*. To support pupils with planning the investigation, we revisited the core components of the scientific method using the *Sticky Note Enquiry Planning Tool* and found these accessible and of great help because our pupils became confident in using these tools to plan their own investigations.

The fact that they had been exposed to scientific vocabulary and tools certainly helped our pupils and those needing additional support to actively participate and remain engaged throughout the whole process, from the planning stages to the share day.

Chiswick House School pupils sharing their findings during their Great Science Share







GSSfS in Malta & Gozo – what did we learn and what next?

As science education leads on the island it is inevitable that we may receive feedback that pupil-inspired or pupil-led investigations can be more time-consuming when compared to pre-planned ones by teachers. We acknowledge and appreciate this as a symptom of an approach that has shown great benefit and engagement for our pupils. For us, it comes back to why we are science educators in the first place – and as the Ministry for Education, Sport, Youth, Research and Innovation (MEYR) and teachers at Chiswick (and indeed many other participating schools in Malta this year) we value and work to develop the skills and attributes for our young people to thrive as future scientists, science communicators and citizens.

The Great Science Share for Schools campaign has become something we are committed to using – whether woven into existing programmes at national level, or by adopting it as an annual campaign to promote enquiry-learning across our schools. We recognise that by being part of the GSSfS international community we are working with many others who share the same values and our professional learning and reflections across Malta, and with other educators worldwide we are all finding out more about how best to implement and support this way of learning.

As the Ministry for Education, Sport, Youth, Research and Innovation (MEYR) and science leaders continue to support the transition from teacher-directed learning we learned that:

- Pupils are more capable than we often assume – given the time and the right support, pupils can pose thoughtful scientific questions and engage with fair testing.
- Ownership drives motivation – pupils were eager and more invested in their investigations when they were based on their own questions.
- The scientific method became more meaningful – rather than ticking off steps, pupils began to understand why each step of the investigation process is essential.
- Science becomes a language for understanding the world – pupils started becoming more inquisitive about everyday situations. We also observed an

increased ability in applying their knowledge in real-world contexts.

Whether at a national scale or through school-based initiatives, Great Science Share for Schools has made an impact in Malta, with room to evolve further. As DSVP we have ongoing meetings with Professor Lynne Bianchi and her team to discuss and plan how to integrate GSSfS and collaborate further. The success of GSSfS in Malta is not only about a single event or initiative. Rather, it reflects a broader cultural shift toward pupil agency, collaborative enquiry and equity in science education. In this context, our aim is to introduce and support educators at the primary level with the valuable GSSfS resources to continue enhancing the teaching of science through enquiry. Through joint efforts between national bodies and individual schools, we continue to support pupils with the tools and the voice to engage with science meaningfully. As we continue this journey, we remain inspired by a simple yet powerful idea '*Ask, investigate and share scientific questions that matter to you.*'

Five key takeaways

1. Malta's National Education Strategy (2024–2030) highlights STEM education as essential for developing creativity, critical thinking, and problem-solving from an early age. Policy makers and senior leadership endorsement is critical to the initiation of new programmes in new contexts – in Malta the involvement of the Directorate for STEM & VET Programmes within the Ministry of Education and individual non-state schools led to a strategic agreement to profile the campaign.
2. Alignment with Great Science Share for Schools (GSSfS): The GSSfS campaign supports Malta's vision for pupil-led, enquiry-based and inclusive science learning. Adopting the GSSfS approach inspires other educators thus finding opportunities to link, align and embed practice across cultures and curriculums.
3. Teacher and specialist support staff training was key. A virtual approach was supportive but not enough to leverage change. Headteachers and teachers benefitted from direct development from the campaign team.
4. An agreement-over-time means that learning cuts both ways. It has been essential that the GSSfS campaign team learnt from Maltese teachers about their areas of strength in STEM education and their areas of development. Modelling approaches to address their growth areas was important.
5. Timing and flexibility are necessary ingredients for embedding a new programme in a new setting. The inclusive nature of GSSfS meant that the team were open to adapting the campaign to really make a difference to teachers and pupils.

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Developing, recalling and embedding scientific vocabulary through GSSfS

Kulvinder Johal, Nathan Williams, James Bennett, Emily Fisher and **Claire Hofer** reflect on the way in which GSSfS provides inspiration for pupils to learn and develop scientific vocabulary when working scientifically

The idea behind the Great Science Share for Schools (GSSfS) campaign is simple and uncomplicated: give children the chance to ask their own scientific questions, investigate them and then share their learning with others.

Our team has reflected on the features that makes it so effective and how teachers in Kent schools (an area of high socioeconomic disadvantage, with schools averaging pupil premium rates of 50%) have found it to be highly effective in encouraging pupils to properly talk about science!

Explaining and justifying ideas

If you think about your setting, to what extent are you able to give enough time and support to pupils to do more than just repeating facts or answering test questions? To what extent are you truly able to give the space where pupils can explain their ideas, justify their predictions, and respond to new questions with each other?

In this article we explain how GSSfS can provide inspiration for teachers to take time to focus on enriching working scientifically. We focus on the way that undertaking a GSSfS sharing event with pupils from different schools or classes has led to them confidently engage with each other, and in particular peers they'd never met before. We have also seized the opportunity to teach and embed the use of accurate scientific vocabulary and the promotion of reasoning as pupils explain their questions, investigations and outcomes to each other.

This article focuses on the way in which we have capitalised on the experience of GSSfS to focus on the development of pupils' oracy in science. Many schools in the UK have noticed that oracy confidence amongst our pupils has decreased over the past few years. Many more classes are seeing elective mutes and the

On the 16th June, Discovery Park in Sandwich (South East of England) organised a fantastic Great Science Share for Schools event. Since 2023, Discovery Park has hosted the Great Science Share, recognising it as an ideal venue to inspire scientific enquiry, with its strong heritage of over 70 years at the forefront of pharmaceutical research and development. This meant that 250 pupils from a range of schools across Kent came together, hosted by the Stem Hub part of Canterbury Christ Church, part of an ongoing series of STEM opportunities provided in partnership with the Primary Science Teaching Trust.

Teachers brought groups of 8 pupils from different schools, having met online and clubbed funding together to hire a coach that could pick up pupils from multiple schools

recent SEND data release shows that the primary need identified for one in four pupils is speech, language and communication needs (25.7%). (see *Useful link*) resulting in oracy being a key part of school improvement plans and a daily issue in classrooms.

Developing Tier 3 vocabulary through GSSfS

The campaign's emphasis on collaboration and sharing provides an ideal opportunity to build on all the teaching and learning of oracy that is regularly happening in our classrooms today. The experience provides inspiration and time for pupils to speak clearly, articulately and confidently, and gives them a real audience and prestigious context to do it in.

Research by Alex Quigley (a leading authority in enhancing oracy), in his *Closing the Vocabulary Gap* publication (2018), sheds light on what is now commonly referred to as '*tiered vocabulary*'. He explains that there is a hierarchy of vocabulary form Tier 1 to Tier 3. Tier 3 vocabulary includes subject-specific vocabulary particular to science concepts e.g. stamen, insulator, ventricle etc.

The Education Endowment Foundation's *Improving Primary Science* Guidance (2023) provides a range of recommendations to educators. It recommends that we should, '*develop people's scientific vocabulary*' and in doing so be able to create, '*opportunities for repeated engagement and use over time*' (Recommendation 1). This is very much at the heart of what the Great Science Share enabled teachers involved in the Kent GSSfS to foster, together with encouraging people to explain their thinking, whether verbally or in written form – also key points of recommendation in the guidance.

Table 1

Vocabulary tier	Examples
Tier 1 – words that are encountered day-to-day.	push pull metal object
Tier 2 – words that are important across many science topics.	predict compare observe describe
Tier 3 – words that are specific to a science topic.	magnetic nonmagnetic bar magnet oesophagus

Methods used to develop, recall and embed vocabulary

There were a number of ways teachers prepared for the Great Science Share. Initially, this began with quality first teaching in the classroom, ensuring that vocabulary was at the heart of the lesson.

- Using working walls and knowledge organisers to introduce new vocabulary, as a prompt to use those words in oral and written work once taught.
- 'Think, Pair, Share' group work or whole class work ensured that all pupils were given different opportunities to communicate their learning in a variety of ways.
- Sentence Starters provided prompts to support pupils to initiate and structure their sentences.
- Mini-whiteboards provided an alternative and quick-write way to jot down their ideas and sentences to rehearse out loud.

Practice was also important. Once pupils had come up with their ideas in lessons, they were given other opportunities to share the learning in school with other classes and year groups. This led to them building confidence and having practice time to recall and embed the vocabulary, where they verbalised their understandings independently and without prompts.

Using GSSfS resources to support scientific vocabulary and oracy

In the lead-up to this year's Great Science Share for Schools, several teachers requested help since it was their first involvement. An initial meeting on *Zoom* gauged interest and explored different ways teachers could do the preparation work for the science sharing in school. They considered the pros and cons of individual, small group, single class, or a whole-school involvement and feasibility.

Exploring the range of resources available on the GSSfS website was also useful, from reviewing the short *Skills Starter* videos that support both teachers and pupils in specific aspects of working scientifically. We also looked closely at the *Great Guided Enquiries* as some schools were initially unsure about giving pupils the freedom to generate and pursue their own questions.

By sharing examples of pupils' work and questions from previous years, teachers received reassurance about the quality of learning that could be achieved; not only in science knowledge but also in confidence, curiosity, and communication.

Features of the resources that offer particular support for the development of scientific vocabulary and oracy are shown in Table 2.

Table 2

GSSfS Toolkit Resource	Oracy development
GSSfS Enquiry Planning Tool	This supports pupils' cognitive skills when coming up with an enquiry question together. Pupils could work individually or in groups, supported by staff who prompt their thinking with open-ended questions such as: How will you test that? What do you think might happen? How can you make it a fair test?
GSSfS Question Makers	Encourages exploratory talk. Use these in small groups to develop collaborative group discussion skills. Get pupils to develop a question together and articulate their choices and reasons why.
GSSfS Prediction Prompts	Supports pupils' vocabulary development by using the correct scientific vocabulary to predict what may happen.
GSSfS Conclusion creators	Supports pupils' vocabulary development by using the correct scientific vocabulary to conclude what they have found out, linking it back to their original question.
GSSfS Reliability Checker	Supports collaborative group discussions when critically evaluating data sources. Use this as a prompt during small group discussions on the reliability of information.
GSSfS Share Prompts	Supports pupils in deciding which audience they will share their science work with and to consider various ways in which they can communicate their science.
GSSfS Talk Prompts	Supports pupils in talking effectively in groups by thinking about the verbal behaviours they use when they react to what other people say and seek to clarify understanding in discussions.

Positive outcomes on pupils' oracy that we continue to notice

1. Pupils increased in confidence in oracy and using scientific vocabulary

We have come to expect pupils using Tier 3 vocabulary when explaining their questions and investigations, showing motivation to shine. For us, recalling higher order science vocabulary as they demonstrated their investigations to other pupils enabled us to see first-hand what they have learnt in lessons.

> *'I liked being the expert. We do science at school, but today we shared it. That made it feel really important.'* 9–10 year old pupil

2. Confidence to communicate science to new audiences

This is what we consider the pinnacle of being able to show you what they know: being able to transfer the vocabulary, skills and learning from the classroom to another setting outside of their comfort zone. By engaging in GSSfS, pupils have really shown that if they have fully harnessed the science skills of working scientifically themselves, they are increasingly confident to articulate their learning and are proud of the outcomes they have produced.

> *'I felt nervous at first, but when I started talking about our experiment, it just flowed. I didn't know I knew so many science words!'* Year 4 pupil

3. Pupils embed disciplinary literacy

Developing the language of science is what's needed to engage in discussions and debates where pupils can apply scientific vocabulary in context. One teacher, who has taken part in three of these events now said:

> *'I've seen just how powerful GSSfS can be not just for developing science knowledge, but for building confidence, especially when it comes to oracy. Events like this don't just happen in isolation, they feed directly back into classroom practice. Since getting involved with the Great Science Share, I've noticed a real difference in how our pupils approach science. They speak more confidently in lessons, they're more willing to explain their thinking, and they use key scientific terms with far more understanding and purpose.'*

Sharing with a new unfamiliar audience strengthens pupils oral and scientific confidence

4. Pupils were encouraged to recall previous learning

Retention of learning is enhanced through experiential opportunities and GSSfS provided this in bucket loads! This helped them to embed and consolidate the learning, reminding them of key knowledge and concepts to the point where teachers explained that the pupils 'really owned it'.

> *'It was fun talking to other schools. They asked questions we didn't think of and it made us think more about our results.'*

5. Linking learning, knowledge and modelling skills with real world contexts

The links to the Global Sustainability Development Goals and real-world research contexts also led to increased engagement and interest; something that often can be difficult to do in the fast-paced standard timetabled lessons.

> *'Great Science Share helps make science more visible, more relevant, and more accessible. It promotes the very skills and approaches that we know are essential if we want primary science to be high-quality and inclusive. It's not just about experiments, it's about empowering pupils to think, question, and share. And that, for me, is the real magic of the Great Science Share.'* C. Hofer

In summary

GSSfS in Kent has fast become a highlight of our schools' calendar and we consider the impact on pupils' oracy to be significant. The emphasis on communication during the campaign preparation and the sharing event always leads to pupils having so many questions and presenting their enquiries with creativity and flair. They consistently rise to the challenge.

We have also noticed that pupils who can be reluctant to even raise their hands at school are confidently exploring the science projects and speaking to their peers during the sharing events. They have been heard to ask pertinent questions which broaden their scientific knowledge and interests.

> *'Some of our pupils are eager to share their learning with as many people as possible. It is so refreshing to attend an event where the pupils really are in charge of the conversations.'* E. Fisher

What next?

GSSfS continues to show that when pupils are trusted to lead their own learning, they not only develop scientific skills but also a lasting sense of curiosity and ownership over their ideas. It is a powerful reminder of how science can inspire, connect, and empower young learners across all settings.

USEFUL LINK

https://explore-education-statistics.service.gov.uk/find-statistics/special-educational-needs-in-england/2024-25 (Accessed 2.12.25)

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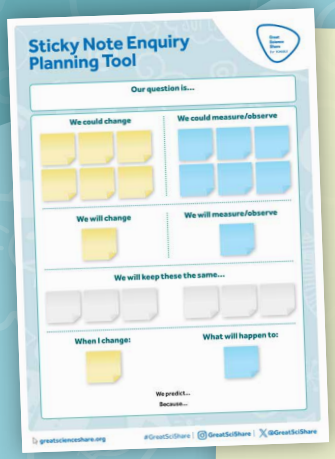
Great Science Share
for SCHOOLS

Great Science Toolkit

Downloadable prompts for pupils to improve each aspect of the enquiry cycle – for ages 5-7, 7-11 and 11-14 years



Enquiry Planning Tool

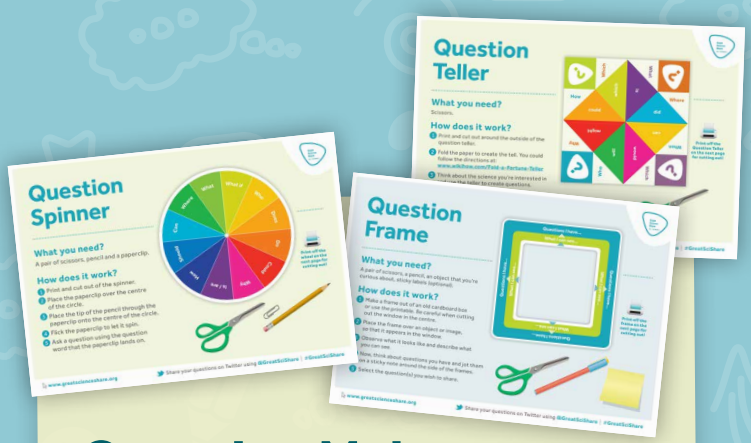
What? Structures enquiry planning from question start to conclusion

Why? Clarifies the difference between independent and dependent variables

Prediction Prompts

What? Sentence starters that structure predictions across 3 age phases

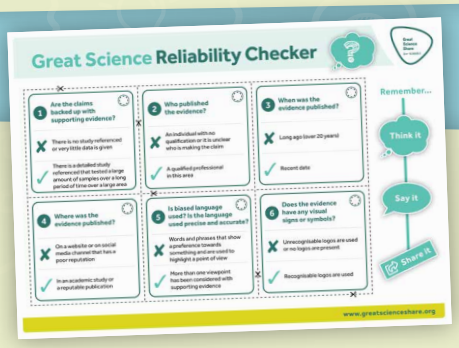
Why? So that early ideas about what might happen are linked to reasoning



Question Makers

What? Question starters to inspires pupils to ask different questions

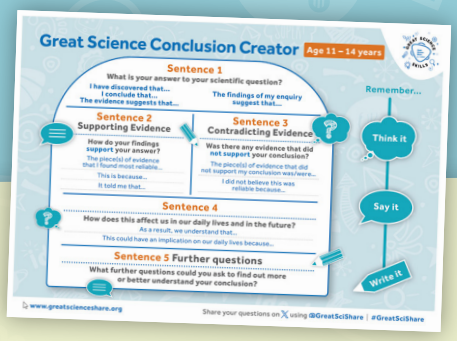
Why? Providing lots of questions to handle and build towards an enquiry scientific question



Reliability Checkers

What? 6 question cards to evaluate the trustworthiness of information

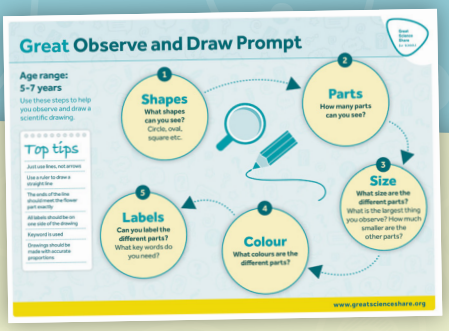
Why? To improve research by secondary sources by moving from fact finding to critiquing and judging what's been found



Conclusion Creators

What? Sentence starters that structure conclusion writing across 3 age phases

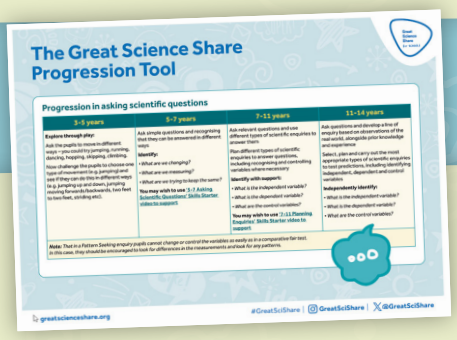
Why? So that conclusions are drawn from evidence and linked to conceptual understanding



Observe & Draw

What? Step-by-step prompts to enhance scientific drawing skills

Why? So illustrations of observations of the natural world and scientific equipment are drawn with precision and accuracy



Progression Tool

What? Each part of the enquiry cycle explained across 4 age phases of learning

Why? Assisting adaptive teaching, assessment for learning and feedback to improve pupils' working scientifically knowledge and skills

Talk Prompts

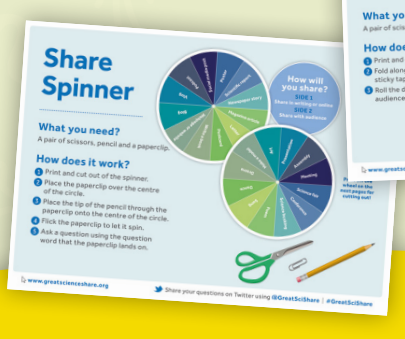
What? 6 talk prompt cards to stimulate reacting and clarifying verbal behaviours

Why? So that pupils can influence ideas and opinions in a constructive and purposeful way

Share Prompts

What? Two tools to encourage sharing ideas in diverse and creative ways

Why? So that pupils acknowledge that sharing science isn't just about writing reports



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It's all about the 'Team'!

Dawn McCann and **Tina Whittaker** reflect on the impact of building an effective team to create a successful Great Science Share for Schools in Stoke-on-Trent, during its 10th anniversary year.

GSSfS 2025 was an incredibly exciting opportunity for Stoke-on-Trent schools, indicating a significant shift from individual school-based science shares. The aim was to inspire pupils and connect teachers in collaborative professional development by removing isolated working. Drawing on the central vision we created a dedicated Stoke Great Science Share team including Hillside Primary School, Port Vale Football Club (PVFC) and Science Across the City (SATC) and focused on collaborating, innovating, and capacity-building in our local schools. Throughout the article we've considered the key learning points that emerge from the Stoke experience!

What guided the thinking of the Stoke GSSfS team?

The Stoke GSSfS team sought to enable teacher development by active participation, collaboration, and reflection on science learning. Focus was given to identifying and questioning assumptions about how children learn in science and exploring STEM aspirations locally in the region. This approach responds directly to the Education Endowment Foundation guidance (2023) that recommended that there was need to strengthen science teaching through effective teacher professional development. The team were also aware of Ofsted's independent review (2023) of schoolteachers' professional development that found that many teachers lack regular allocated time for development and rarely had enough time to reflect on their own learning or apply it in practice.

What did it take to make a great GSSfS team?

A collaborative team of educators and community stakeholders came together to give due regard to this question. For authentic team togetherness, the first and essential step was to confirm that everyone shared similar beliefs and values. The 2025 GSSfS theme, Connected Science, sparked early interest for both the lead collaborators, Science Across the City (SATC), and Port Vale Football Club (PVFC). We quickly realised that these shared commitments to improvement of educational outcomes would drive us towards empowering our local community.

With this in mind, the next step was translating this organisational commitment to actions, and this brought together people with diverse and complementary skills, knowledge and experience. We have likened creating a great GSSfS team to what it takes to have a great football team – something particularly apt as our venue was Port Vale Football Club stadium. As in any football team, success relies on thinking about how '*the whole is greater than the sum of the parts*' and that each individual or group involved has a part to 'play'. Roles and demands were multifaceted, and all contributed to a great team outcome.

Table 1 is our reflection to consider roles and responsibilities of great teams and compare the similarities between football and GSSfS teams. We took inspiration to create this as our GSSfS event was based at Port Vale Football Club, so the links to the game were fresh in our minds!

Key learning point: GSSfS operates on a range of levels, and, when working at scale across a Local Authority or region, it benefits from clear roles and responsibilities being outlined and understood from the outset.

What difference did a team approach make?

Each team member brought their own expertise, yet what truly elevated the process was mutual knowledge exchange. Co-creating the GSSfS experience developed professional respect, awareness and new understanding

Table 1 Analogous comparison between roles & responsibilities towards success in GSSfS and football team structures

How do the roles of a great GSSfS team compare with a great football team?		
Great Science Share role	**Description of the role and responsibility**	**Football team role equivalence**
Great Science Share for Schools Campaign creators (The University of Manchester)	Vision and values setting, outlining protocols, providing guidance and a sense of community.	A National Body, e.g. the Football Association
Great Science Share for Schools organisational/local champion(s)	Knowledge of local vison and need, strong connections of partnerships that will enable success. Local strategy.	Club/Foundation e.g. Port Vale Football Foundation and Science Across the City
Great Science Share for Schools leader(s)	Deep local knowledge, networks and ability to co-ordinate action, knowledge of tactics and training that have happened before and that can bring about success.	Manager/local specialists and leaders e.g. Primary Science Advisory Teachers/Community School Improvement/ Outreach officers
Local schools, science subject leaders, teachers and/or educators	Defining the 'game' – working together to strategise the curriculum or extra-curricular offer – the training and activities that engage and develop learning and enhance players' development.	Full team/squad
Pupils	Involvement in the learning activities, active participation, investment in the game/learning process. Showcase learning and progress of talent.	Football players
Audience including peers, other teachers, organisations and VIPs e.g. The City Lord Mayor, trainee teachers, local authority school improvement officers, cultural group representatives	Offer encouragement, advocacy, recognise, reward, celebrate, care, show passion.	Club mascot and supporters

as idea sharing and idea refining called on each other's insights and informed new perspectives. We tackled a range of challenges, such as how to best recruit schools, safety management, ensuring teachers recognised the curriculum relevance and how we effectively communicated our activity for maximum engagement.

What kept us cohesive was a clear shared vision of wanting to host a high-quality science event that would inspire and engage pupils from across the city and strengthen city-wide connections. Securing an inspirational venue was a crucial early win, and this undoubtedly was a valuable and generous offer from the football club. Then with venue and team secured, our plan for our 2025 GSSfS event was ready to launch.

Key learning point: Clear roles, defined goals, and regular communication ensured a coordinated approach.

What did it take to train teachers – our 'players' – for a great GSSfS?

Engaging science leaders and local science influencers from schools across the city drew on the strong, existing network established through Science Across the City (an established school-improvement that ran for three years). Response from schools and science leaders was swift and well-received, resulting in 15 school sign-ups within two weeks.

Key learning point: Where possible, we used existing local networks, which meant the opportunity built on current practice and supported ongoing development for the schools.

Having a local science leader (Dawn McCann of Hillside Primary School) was pivotal to enabling professional learning across multiple schools. As

a teacher herself and coach to science leaders, Dawn brought quality of knowledge and deep professional understanding when engaging teachers in webinars, virtual drop-in sessions and face-to-face meetings. She actively drew on the resources on the GSSfS website to support her role.

> *'Using the GSSfS Guided Enquiries was a new style of science teaching to me, but something I will definitely be using in the future.'* Science leader

Dawn was key to providing responsive feedback that stimulated teachers to reflect on and improve suggested questions and investigation plans that their pupils would share at the GSSfS.

> *'I found the suggested online resources from the GSSfS website useful in supporting questioning when coming up with our own enquiries – something I will definitely be using again!'* Lead science teacher (PSTT Fellow)

The existing trust, rapport and relationships that were notable in Stoke's science leaders group allowed reflections to focus on maximising pupil engagement through good investigative methodology. Asking questions to investigate focused on localised and personalised contexts with teachers being comfortable to seek advice, consider alternatives and advice given to them.

Key learning point: Having a local teacher in 'the thick of it' had a powerful impact on teacher development.

What were the highlights of the Stoke GSSfS?

The dedicated training to prepare the teachers and children led to the event being filled with great science. Pupils had their own table spaces allocated to each school, where they explained the way they collected data and improved investigations for accuracy and reliability. They talked about the graph plotting they had done to represent evidence gathered through hands-on experiences.

> *'The children were doing great work. Their enthusiasm, curiosity and confidence were such a joy to witness.'* Gary Morris, PVFC

Children demonstrated that they were scientists, that they were passionate about their science and that they could ask good questions of the evidence generated. Enquiry themes included sport science fitness, stadium green sustainability, animal and plant biology.

The unique setting at the football club inspired investigation questions such as, '*What is the impact of leg length on the distance a football is kicked?*', and '*How does the shape of a bird's beak affect the way it collects seeds from the newly reseeded football pitch?*'

> *'We thoroughly enjoyed every minute. It was amazing! I have been busy this morning creating a science share display to share our afternoon with the rest of the school!'* Local science subject leader

The diversity of investigations allowed children to actively participate, creating a vibrant atmosphere of scientific exploration and peer learning. The venue not only provided a memorable experience but also broadened the scope of enquiry, demonstrating how context can enrich science education.

The Lord Mayor and Lady Mayoress of the City also attended, enthusiastically engaging with the science activities and celebrating the achievements of local pupils. Staff from Port Vale Football Club played a vital role throughout the day, helping to create a welcoming and well-organised environment. This broad representation not only enriched the experience for participating schools but also laid the groundwork for future collaborations that will continue to strengthen science education across the city.

What happens next as a result of a great GSSfS?

Following the event, feedback was collected. We asked teachers if they would attend a future GSSfS and 100% responded positively with a 'Yes'!

Notably, one local business expressed an interest in hosting a future Great Science Share event, demonstrating the ripple effect of this year's success. In addition to being a success in itself, Stoke-on-Trent's GSSfS at PVFC has already proved to be much more than a nice day out for team members involved.

> *'I felt that I developed a deeper understanding of a successful science share, secured understanding of successful enquiry questions and it reinforced successes across the city.'* Local science leader

> *'Having seen a Great Science Share in action, I am now inspired to be a part of leading an event in 2026.'* Staffordshire Science leader

Planning is already underway for an even more successful science share in 2026. We aim to build on our achievements by further developing partnerships and expanding opportunities for our teachers, children and host venues with plans emerging for pupils in their first year at secondary school so that this can enable more teachers and children to develop new understanding by listening to each other across different age phases.

The final whistle

Our final whistle is to assert that GSSfS had a powerful impact on professional learning. GSSfS does rely on collaboration working across different groups, nationally and locally. Teachers defining the 'game'; working with local leaders to decide what training and activities are needed to engage the 'players' – the pupils – in this great science sharing event. Stoke demonstrated this effective team ethos that was well coordinated and collaborative, and ultimately will continue to promote their success towards an even better 2026!

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Peer-to-peer learning: showcasing the power of collaborative learning

Kate Sutton of STEM Learning, considers how GSSfS provides a means to inspire and support collaborative learning between pupils

Research demonstrates that when pupils collaborate effectively, they develop social and communication skills that have lasting educational value. This is something that has been at the forefront of our minds when designing how we would involve teachers and pupils in a STEM Learning Great Science Share for Schools (GSSfS).

Aware of reports that promote collaborative learning, such as the Education Endowment Foundation's *Teaching and Learning Toolkit* (2024), colleagues at STEM Learning and I were inspired to explore how we could work towards engaging pupils in high-quality talk, reasoning and explanation in science. We were keen to explore how work that inspired us in writing, such as the Dialogic Teaching Project, could influence the design and undertaking of a teacher and pupil event. With experience of having done GSSfS in schools, we were keen to focus on how '*well-founded classroom dialogue improves student engagement and learning, especially when pupils are encouraged to build on one another's ideas through structured discussion*' (Alexander, 2018).

In this article, we consider how GSSfS provides a means to champion collaborative learning, giving practical ways to structure this with primary pupils. As the Great Science Share places strong emphasis on peer-to-peer learning through the ask, investigate and share approach, we were motivated to have this as a focus.

- How does collaboration to enhance primary science learning happen in your school or setting?
- What does successful collaboration between groups or organisations look, feel or sound like?
- What benefits emerge from collaborative learning between teachers, and also between pupils?

Harnessing the power of collaborative learning

We gave our GSSfS the theme of, '*The Power of Collaborative Learning*' and invited two local primary schools who had not worked together before to take part. This meant we had seventy 10–11-year-olds to involve in our one day GSSfS event. We selected these schools because they are in our community and within close proximity to the National STEM Centre, and we explained that we sought to encourage pupils to use a range of communication skills and demonstrate scientific thinking within a Great Science Share.

The teachers and pupils had never taken part in the GSSfS campaign prior to involvement with us. We came together as a team of ten that included primary teachers; STEM Learning staff; University of York Community, Education and Outreach mentors and a volunteer STEM Ambassador: a retired electrical engineer who had worked with trains, planes and helicopters across his career. We discussed with the class teachers and science subject leaders how we

sought to inspire and celebrate the pupils' curiosity, by making initial connections in online meetings. We liaised about how we would plan, deliver and evaluate the event and brought together our shared intentions. Working collaboratively as a team, we outlined the structure for activities we would lead on and how we could support pupils to follow their scientific curiosities and investigations within these activities.

It was evident that we all shared the same belief: that opportunities which encourage young people to be in the 'driving seat' are so vital if we are to best equip them for success in civic and work life, in a rapidly evolving world. We shared our thoughts on how essential it is that young people not only develop subject knowledge, but the ability to collaborate, communicate and solve problems. The very skills they will need as citizens and as members of a future workforce are shaped by science, technology and global challenges.

The evidence base

Developing transferable skills, including resilience, is increasingly recognised as a key outcome of primary education. Fenwick-Smith *et al.* (2018) argue that '*wellbeing and resilience are essential in preventing and reducing the severity of mental health problems*', adding that equipping children with coping skills helps them '*react positively to change and obstacles in life*'.

These attributes can be nurtured through real classroom experiences that foster adaptability and self-regulation. A recent study on the international SEE Learning program (2024) found that even a short six-week intervention led to '*statistically significant improvements in students' resilience*' demonstrating that these skills can be explicitly taught and strengthened during the primary years. Williams-Brown *et al.* (2020) also report on England's HeadStart programme, highlighting the value of co-constructing resilience with pupils, noting that pupils '*valued the support they received from others*' and underscoring the importance of '*a collaborative resilience-building approach between adults and pupils, where pupils are listened to*'.

These studies reinforce that social interaction and adult facilitation play a role in developing transferable skills such as empathy, perseverance, and emotional regulation. These areas of study relate to our work on the GSSfS, as the coordinating team shared the views that these are necessary foundational capabilities that support pupil's learning as well as inspiring to develop a mindset supportive to lifelong success.

Collaborative learning in our GSSfS

Inspiring pupils to work collaboratively during learning drew on a range of approaches, including:

- practical working that resulted from pupils asking and investigating scientific questions;
- the GSSfS Toolkit which provided support, guidance and prompts when working scientifically with others;
- *These Chips Can* storybook (see *References*);
- collaborative group role cards.

For the rest of this article we have focused on reflecting and reporting on the use of the collaborative group role cards, as our previous work with pupils led us to realise that they required support in this area. We also recognised that bringing pupils together from different schools posed greater challenge for pupils of this age.

▲ **Figure 1** Pupils engaging with the role cards

Some reflections on this approach...

What we did:

We created collaborative groups by mixing pupils from different schools before introducing them to the seven role cards. As shown in Figure 1, these defined distinct responsibilities with the aim to guide all group members to have a clear role which was purposeful to the process of working scientifically. Some of the pupils were familiar with this type of 'role allocation' from school activities, but many were not.

What we found:

Pupils chose their own roles effectively, some needing more guidance to take on an appropriate role and some needing more support/encouragement to engage. They worked well together by sharing predictions, testing ideas and drawing conclusions together. It was striking to see how most attempted to use the allocated roles to challenge, support and build on each other's thinking, not always perfectly, but with genuine intent and engagement.

> *'I was the Maker, I like getting my hands on the equipment to figure out the task.'* (Olivia, aged 10)

> *'We built on knowledge we already had about electricity.'* (Frankie, aged 11)

The teachers and adults at the event acted as facilitators, role models and prompts for the pupils. They gave support with how to talk about findings and introduced and explained scientific vocabulary when required. Some pupils were evidently more confident than others, speaking out and taking stronger leadership roles, although we didn't notice any specific tendencies related to gender. Pupils genuinely seemed to find it a challenge to work with other peers, but engaging too.

> *'I was the leader; I am confident so could do that. We got to know the other children there throughout the day.'* (Brandon, aged 10)

> *'We have worked with some of the kids from the other school before which helped. We were happy to share our ideas together. We shared our ideas to work out the best ways/techniques.'* (Aliyah, aged 11)

Teachers commented on the benefits of using the role cards. They specifically commented that less academic pupils engaged in a much more hands-on way than usual in these types of tasks. They explained that some pupils who are usually quiet became more confident when sharing their science with people outside the class/visitors.

Other benefits

We found the GSSfS Guided Enquiries really useful in supporting a collaborative approach to learning. They incorporated opportunities for pupils to work in pairs and small groups, and were designed to encourage pupils to engage in real-world contexts, share their preconceptions and understandings and discuss outcomes. Using the *Great Ocean Share* and *Great Electricity Share* supported collaboration by:

- having hands-on practical work as a core element of learning. This meant that pupils were required to select and set up equipment, take and record measurements and analyse and share outcomes. The practical nature of the enquiries were ideal for groups of between four to seven pupils working together.

  > *'I loved exploring how the sweets lost their colour – it was a really good way to help me explain what is happening to the coral in the oceans.'* (Frankie, aged 11)

- Pupil-to-pupil discussions were supported through specific tools, such as the *Question Makers*. These inspired question-asking and the *Conclusion Creator* provided prompts to support the children in articulating outcomes from their enquiries.

  > *'The Conclusion maker helped us to start to explain our answers; for example it helped me say 'This experiment shows this...'. They were good to show us how to explain our ideas.'* (Daniel, aged 11)

- Using a story (*These Chips Can* by Jules Pottle) peaked pupil interest and instigated discussions about changes to technology over time. Linking science to the real-world and their own lives was a useful way to involve pupils in talking together about their own experiences in and beyond school.

Reflections on supporting collaborative learning

There are always pros and cons to things we try, and this was no different. In hindsight, the project team considered that it would have been beneficial to have given the pupils opportunity to develop confidence with working within peer groups prior to forging mixed groups across the schools at the Great Science Share.

We also think that pupils would have benefitted from having used the role cards in regular science lessons as this would have allowed more time for the hands-on activities.

We found the group/role size of seven to be a maximum appropriate group size- teams seemed to naturally vary between four to six. This allowed for optimum group collaboration/effectiveness.

We noticed that some groups needed support to take turns or to remain focused on the task. Considering they were in an unusual space it may be that this influenced their attention, however this reinforces the importance of scaffolding the collaborative process. We could further think about the feedback for pupils to better enable them to recognise what went well and how to further improve through encouragement and explanation/reasoning about ways of working.

Lastly, we think that it may be beneficial to have a wider range of cards from which teachers can select. In this way, teachers could identify the roles that they most particularly wanted pupils to develop. It would also support a sense of progression and development over time.

Final reflections

The power of Great Science Share for Schools to promote authentic, collaborative science learning was definitely evident in our experience. As a teacher who has run GSSfS events at school over the past ten years, this experience reinforced everything I value about the campaign. When given opportunity to ask, investigate and share, there is a real opportunity for pupils to work collaboratively and build confidence and curiosity so that scientific thinking can flourish.

We are now keen to further develop these approaches and have discussed how our experience aligned with recently published research on supporting purposeful, reflective practical science as defined and discussed in the *Purposeful Practical Work in Primary Science* report by Earle *et al.*, 2025.

In this report, the researchers consider the purpose of practical work. They identify 10 purposes from a global literature search, one of which is that practical work is undertaken to '*develop personal and social skills e.g. oracy, collaboration, perseverance*'. For us, this was very much the case, and the activities we used in our Great Science Share sought to support pupils to develop skills and confidence in using the practices of science (Figure 2). However, we also recognise how the practical activities also went beyond 'just doing' and strongly involved pupils being supported and promoted to use scientific vocabulary and connect their conceptual understandings about topics such as electricity, dissolving etc.

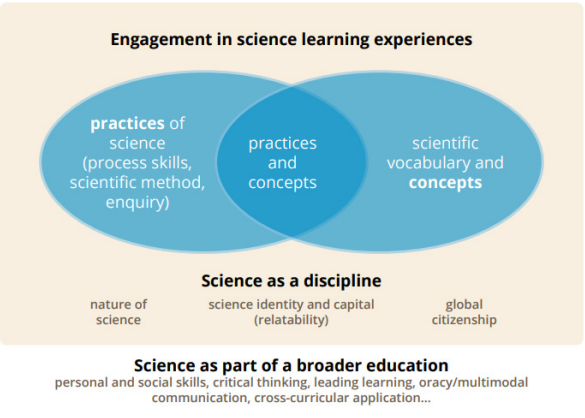


Figure 1. **The Purposes Framework:** a framework for prioritising the purposes for practical work in primary science, with core purposes in white text

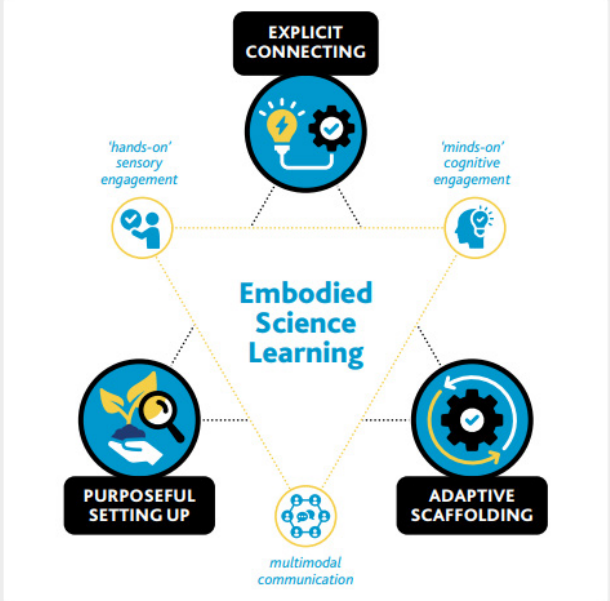


Figure 2. **The Pedagogy Model:** a pedagogical model for practical work in primary science, with mechanisms to stimulate children's learning (yellow triangle) supported by the teacher curating the learning experiences

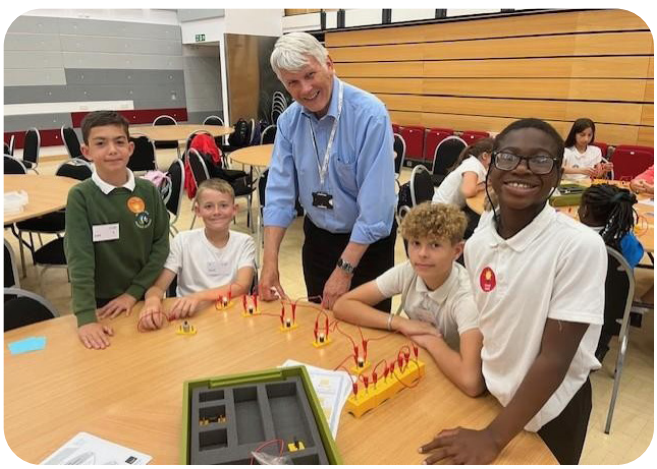
▲ **Figure 2** The Purposes Framework and Pedagogy Model, taken from Earle *et al* (2025)

By working together, we valued the way that these understandings and confidence developed with and through the engagement with others, in a social setting. Pupils were given peer and teacher support through the scientific thinking process, working together to predict what might happen and to communicate their observations and their findings using scientific methods and terms. Without the opportunity to collaborate, we don't think that the outcomes would have been so rich for the pupils who were definitely hands-on

and minds-on during the experience, drawing on both sensory and cognitive modes. In future we could explore further how we could support pupils to select styles and approaches to the way they communicated findings and outcomes to each other, which in our case relied mainly on prior knowledge, plus support from the GSSfS Toolkit and staff/volunteers.

Beyond the immediate science outcomes, we evaluated and reflected on the fact that GSSfS doesn't just support science learning. We have valued the way we can see it influencing the way teachers worked with us to build awareness and practise of the skills and characteristics that young people need to thrive as learners, collaborators and citizens more holistically.

Of course, with any work like this it is vital to keep up the drive and motivation to build on and respond to our reflections. It was an amazing experience for all and in the coming months we will hope to continue to explore how STEM Learning can further harness the opportunity that GSSfS offers to strengthen the power of collaboration between young people and scientists, thereby further deepening science learning for many more children and educators of the future. Here's to the next ten years.



▲ **Figure 3** Pupils collaborating with support and interaction with STEM Learning staff and Ray, volunteer STEM Ambassador and electrical engineering expert

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Science shared, stories told

Sara Jackson and **Mandi Banks-Gatenby** explain how GSSfS complemented a Home Education programme linked to Manchester Museum

In June 2025, families from the Greater Manchester area who home educate gathered in the Fossils and Dinosaurs Gallery at Manchester Museum to share their science learning. This was our first Elective Home Education (EHE) Family Science Share event held in collaboration with the Great Science Share for Schools (GSSfS) team. The event showcased how important place is in the learning process and how informal learning spaces, such as museums, can act as catalysts for high-quality science engagement and communication.

Understanding EHE: diverse learners, shared curiosity

Elective Home Education (EHE) in the UK refers to a legal option where parents take full responsibility for their child's education outside the school system. Recent UK Department for Education data indicates that more than 111,000 children were recorded as EHE in autumn 2024, compared to an estimated 80,900 children in autumn 2022 (Department for Education, 2024). This growth reflects a wide spectrum of motivations: some families seek flexibility to tailor learning to individual interests, others prioritise approaches that better support neurodiverse learners, and many are drawn by pedagogical philosophies that emphasise autonomy and creativity.

The richness of the EHE community lies in its diversity. Some families bring deep disciplinary expertise such as engineering, medicine, or ecology, while others approach science with curiosity and a desire to learn alongside their children. This creates fertile ground for peer-to-peer knowledge sharing, where learners and parents exchange ideas, demonstrate experiments, and co-construct understanding. At the Manchester Museum event, this approach was evident as children explained their projects not only to visitors but to each other, sparking conversations that extended beyond the displays.

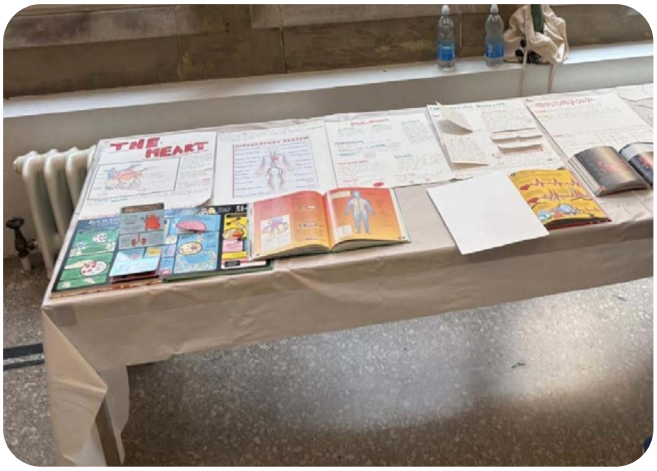
These practices demonstrate the concept of funds of knowledge (Moll *et al*., 1992), which recognises the cultural and experiential resources embedded in households and communities. When learners draw on everyday experiences, whether it's a passion for mechanics, observing nature, or engaging in creative arts, there is an opportunity to connect scientific ideas to meaningful contexts. By valuing these funds of knowledge, educators and institutions can design experiences that honour what families already know and do, while opening pathways to new scientific thinking.

Funds of Knowledge: This concept, developed by Moll *et al*. (1992), recognises the valuable knowledge and skills that learners acquire through everyday life in their homes and communities. These include practical know-how, cultural practices, and informal expertise that can enrich formal education when acknowledged and integrated.

How did we get here? Building the partnership: from grant to gallery

The journey to the Museum GSSfS event began with the small grant award to support practical science engagement for EHE families. An online launch meeting in March 2025 brought together a diverse group of parents and carers. This led to the formation of a Science Steering Group comprising of parent volunteers. Two practical workshops were held at Manchester Museum that introduced science practical skills via microscopy and cell modelling to 30 participants aged 5–14; and explained the way pupils would share their science within a GSSfS celebration event.

The Museum Science Share Event



GSSfS Heart stand

Inquiry and informal learning

The inclusive and child-led nature of enquiry being promoted by the Great Science Share for Schools campaign is what gelled with the EHE steering group's ambitions. The opportunity to allow learners to share both structured investigations and spontaneous interests was ideal to enable peer-to-peer knowledge sharing, where learners and parents exchange ideas and scientific findings.

Enquiry-based learning was evident throughout in what resulted in an in-person science share. Learners posed questions, tested ideas, and explained findings to peers and adults in the museum setting which inspired dialogue and made science feel accessible and exciting.

The range of science questions exposed learners' curiosity and approach to science:

- **How does blood flow in the heart?** One learner presented a detailed model of the human heart, explaining how blood flows through its chambers, linking this to how modern medicine and cardiology tools help diagnose heart conditions.
- **How does gravity affect the way that water travels?** Another family shared their learning via a poster representing their understanding of science concepts obtained from a practical activity at home building a 'Heron's Fountain': a water-based model demonstrating principles of pressure and gravity.
- **How do fossils provide evidence for how life has changed over time?** A sibling pair hosted a palaeontology exhibit sharing knowledge of fossil samples and discussed how scientists use evidence to understand prehistoric life and evolution. The Fossil Gallery couldn't be a more fitting place to share this learning!
- **How does the shape and size of a toy car affect how fast it travels?** The monster truck investigation involved measuring speed and mass, with learners testing how different toy configurations affected motion: it was hard to predict how much speed reduction a polystyrene Nerf gun dart would cause compared to other toys tested!
- **Why are trees amazing?** One child created a visual science display combining artwork and ecology to explain photosynthesis, biodiversity, and the role of trees in climate regulation.

Although not shared visually on the day, another learner explored the acidification of oceans using red cabbage indicators to test pH changes. This investigation was inspired by GSSfS Guided Enquiry: *The Great Ocean Share* which highlighted how the campaign's open access resources can work ideally for EHE families beyond the classroom.

> *'The children all came up with such a breadth of topics to explore, and it was great to see them telling each other – and other visitors to the museum – about their projects. The Fossil Gallery location couldn't have been better!'* Parent

So how does a non-traditional classroom space work for GSSfS?

On reflection, the Fossils Gallery at Manchester Museum was more than a venue, it was a catalyst for learning across parents and pupils within families. It offered a space where the power of place-based learning could be explored, where the physical environment became part of the pedagogy. Surrounded by towering dinosaur skeletons and ancient artefacts, learners were immersed in a space that invited them to engage with real-world science phenomena. It encouraged them to work their muscles of curiosity and dialogue and provided a judgement-free space where they could learn together with others, gaining a sense of belonging within the EHE community. For many EHE families, this was their first time presenting science in a public setting, and this was a springboard to enabling learners to collaborate with other learners who they may otherwise not have met.

> *'My son, who can be shy, was so inspired he is now set on participating in potential future events. His ideas are already in motion on experiments he would like to try out.'* Visiting EHE parent

Place-Based Learning emphasises learning that is rooted in local environments and contexts. It connects scientific ideas to real-world settings, encouraging learners to engage with their surroundings and community through inquiry and exploration (Gruenewald, 2003).

As confidence grew, so did the sense of community. The collaborative atmosphere grew organically. Families who had never met before began exchanging ideas, and children eagerly explained their projects to one another, often surprising their parents with their confident communication! Later, when two visiting primary school groups entered the gallery, the EHE learners rose to the occasion speaking clearly, answering questions, and proudly sharing their science stories. These interactions exemplified the informal, peer-led nature of the event and highlighted how place-based learning supports inclusion and confidence. The day ended with certificates of participation awarded beneath the *T. rex*, *Stan*, a symbolic moment that captured the spirit of the event: science as a shared, lived experience.

Why place matters for confidence and inclusion

Place-based learning does more than provide a backdrop; it shapes how learners see themselves in relation to knowledge. Being surrounded by authentic artefacts and a public audience signalled to families that their science learning was valued. For EHE children who often learn in private spaces, presenting under Stan the *T. rex* transformed their identity from 'home learner' to 'science communicator'. This shift builds confidence because the environment legitimises their efforts and invites dialogue with others, including school groups and museum visitors. Such encounters support inclusion by breaking down barriers between formal and informal learners, showing that science belongs to everyone, everywhere.

> *'The joy in their eyes when they were able to show all their hard work and more importantly what they were passionate about is a memory I will hold dear.'* Parent

So, what's next for the UoM/EHE Family Science project?

This Great Science Share was not a one-off. It marked the beginning of a broader learning ecosystem that can connect and benefit educators and teachers from EHE families, Manchester Museum, and the wider GSSfS community. Whereas the EHE families will continue their work with their learners, the museum will continue to act as a **connector**, bridging access to initiatives, spaces, equipment, and expertise. These will broaden and enhance learner experience, whilst also giving time for funds of knowledge to influence the learning pathway.

Future plans are underway to develop **lab-based workshops** that will allow EHE learners to explore science in more formal settings, supported by researchers and educators whichever way these are exploited, we firmly recognise the benefit of developing family confidence in science enquiry and communication using the resources and webinars, including the *Great Guided Enquiries*, Toolkit and Theme. The sharing event is something that is special, and its open and inclusive nature makes GSSfS a perfect fit to rounding off the year!

Conclusion: a catalyst for ongoing curiosity

The first EHE Family Science Share at Manchester Museum was more than an event, it was a catalyst for change. It showed that curiosity thrives in non-traditional contexts, and that when science moves beyond the classroom into spaces like museums, learners can explore, question, and share on their own terms. For EHE families, often overlooked in STEM outreach, this reinforced that their voices and experiences matter in sccience learning.

The event didn't just connect scientific ideas; it connected people, communities, and institutions around a shared passion for learning. In doing so, it embodied the GSSfS 2025 theme of Connected Science, demonstrating that connection is not only conceptual but relational and spatial. By acting as connectors, the museum and university provided access to spaces, expertise, and audiences, enabling informal learning communities to flourish. This model has the potential to reshape outreach strategies, ensuring that science becomes a shared cultural practice rather than something confined to schools.

Finally, this experience reinforces a vital message: science belongs to everyone, and it is everywhere! When educators, museums, and universities open their doors to informal learners and recognise them as equal contributors, they enrich the scientific conversation and broaden participation. When we open science to families, to communities, and to everyday life, we don't dilute its power, we amplify it! Informal, non-traditional learning spaces like museums are not just venues; they are catalysts for curiosity, inclusion, and lifelong engagement with science. We can't wait to do it all again year on year!

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Sharing Science in the Wild

Leah Bell-Jones and **Jo Montgomery** draw out the learning from another place-based approach to GSSfS

A trip to a zoo provides a unique opportunity to connect children with nature and animals in ways that they might not be able to otherwise. (Feucht *et al*, 2023) (Richardson *et al*, 2022) The experience of hearing a lion roar or seeing the size of an elephant in real life can really be the spark that lights a fire of understanding and respect toward animals, meaning they are more likely to want to protect and look after animals as they go through life. This also aligns with the DfE's sustainability strategy (2023), which outlines the importance of education in young people being passionate about the natural world, wanting to protect it and being able to influence their wider communities. Using the zoo experience as hooks and inspiration offer incredible opportunities for children to wonder, be curious and ask questions that they can go on to investigate, and share!

Colchester Zoo has been a unique science-sharing space where primary children have shared investigation questions and findings surrounded by a vibrant, real-world living context.

'What types of minibeasts can we find in the school grounds?'

'What happens to seashells in acid?'

'How are coral reefs formed?'

COLCHESTER ZOOLOGICAL SOCIETY
Charity no. 1105621

The zoo as a living laboratory

Children's investigations included exploring what plants need to grow, what habitat and conditions frogs need to live, which minibeasts are found in their school grounds, and how cameras work; other groups linked their classroom research about acidity to the marine zone, using vinegar and chalk to test how coral reefs might be affected by acidic oceans.

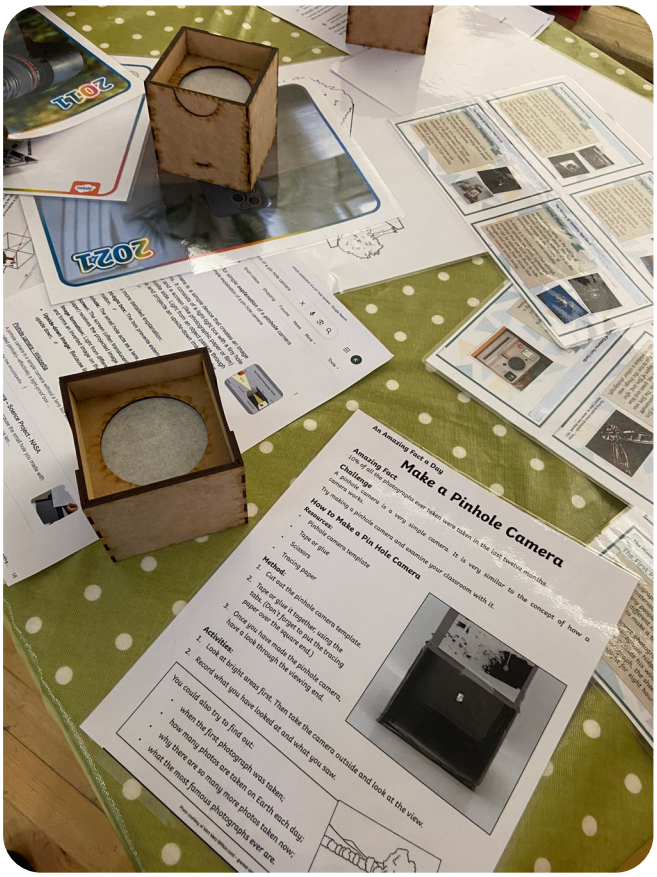
The zoo's education team also helped explain the different scientific research projects carried out at the zoo and how this research supports conservation work around the world. Their examples included:

- **Veterinary research** – such as studying rhino foot health and monitoring leopard hearts
- **Conservation technology** – like using thermal imaging to reduce human–elephant conflict
- **Population studies** – for example, using acoustic monitoring to study bush dogs in the wild

They supported discussions at the different pupil-run stalls by asking guiding questions, helping children share their knowledge, and offering different viewpoints on each topic. They also provided practical support, resources, and facilities for the schools and pupils.

> *'What I love is the confidence the children develop as they share their investigations and see the enthusiasm of other children when they are listening to their explanations.'* Headteacher

By engaging with the zoo's conservation science, children widened their perspectives of who does science and why. They made connections between their own investigations and professional research, developing a more holistic picture of science in action. Visiting the zoo and finding out more about the animals deepened the children's knowledge and inspired further curiosity, questioning, investigating and sharing; increasing the feeling that 'science is *for* me' and done '*by me*', building science capital and supporting opportunities to widen views of who can be



a scientist and what science looks like outside of the classroom (Richardson *et al*., 2022).

Practical Trip Planning Tips for Teachers

- **Before a visit:** encourage pupils to ask their own science questions about animals, habitats, or zoo life. Use the Great Science Toolkit to generate pupil-led questions.
- **During:** use observation tasks, sketching, and note-taking to advance working scientifically skills, and to develop scientific questions the children may have.
- **After:** revisit questions and plan investigations or design challenges linked to zoo learning.

For many children, the Colchester Zoo GSSfS event was their first chance to be recognised as scientists outside the classroom. Learning science in alternative spaces like the zoo provides unique inspiration, encouraging pupils to ask questions, investigate ideas, and share their scientific thinking.

> *'The children have got so much out of the event and been really engaged. Even the quieter ones have really come out of themselves and just loved it!'* Teacher

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Colchester Zoo learning resources: www.colchesterzoologicalsociety.com/education/learning-resources/

Industry-inspired great science sharing

Frances Hunt (GSSfS Project Officer) discusses BASF Plc's support for the GSSfS campaign and their first sharing event held in Stockport with **Helen Clayton** (solicitor) and **Hannah Ridgway** (science lead)

This article profiles the way in which industry partners can support teachers and pupils to get involved in GSSfS. It explores the practicalities and benefits of an industry who are interested and committed to enriching science learning in their local schools.

Frances: *Can you explain why BASF find value in GSSfS?*

Helen: At BASF we create chemistry for a sustainable future. As one of the largest chemical companies in the world, our company is founded on chemistry. We strongly believe that encouraging an early interest in science is important in developing scientists of the future and we want to do what we can to stimulate an interest in science and foster curiosity. We recognise that encouraging young people to consider ongoing study in STEM subjects will be of personal benefit to them but also drive industries like ours in the future. On a very practical basis, with net zero ambitions in the UK and globally being paramount for us all to thrive, we need more people with the STEM skills to drive innovation in this area and we see that supporting initiatives like GSSfS is one way we can promote this ambition more widely.

Frances: How did this involvement develop to hosting your own GSSFS event?

Helen: BASF have been involved with GSSFS since 2017 when we started to take a greater interest in how we could actively influence science education. We recognised further the need to do more when the *10 Key Issues with Children's Learning in Primary Science* by Bianchi *et al*., 2021 was published. As we work with real-life science applications every day, we wanted to get out into our local community and spread some of that knowledge.

Personal care (handwashing experiment): this session aims to increase children's understanding of our skin, microscopic germs and the importance of handwashing. The experiment involves the use of UV 'germ' gel and testing different ways of washing hands to determine which is the most effective.

Food additives (mousse making): BASF produces an emulsifier called *Lamequick*® used in food production to produce foam and enhance the texture of desserts and creams. This experiment gives the children the opportunity to try and make chocolate mousse both with and without *Lamequick*® to understand how the addition of certain ingredients can speed up a process. And they get to eat the mousse at the end!

Agricultural solutions (Biggest Job on Earth): here we aim to show the children how important farming is to all of us. The session links to the KS1/2 national curriculum for science by showing what plants need for optimum growth and it covers the importance of soil diversity.

In 2021, we set up our own STEM Ambassador team, running STEM Weeks and career events for local primary schools in Stockport, local to our new offices. Now we work with three partner schools, including Larkhill Primary School (Edgeley), St Matthew's Primary School (Edgeley) and Dial Park Primary School (Offerton) which would all be considered to be in areas of high socioeconomic disadvantage.

Our team have developed lessons and experiments around many BASF products and applications, including personal care (such as soaps, shampoo etc.), food additives and agricultural chemicals. These all aim to increase children's science capital and their curiosity in the world around them.

Hosting an on-site Great Science Share seemed to be a natural step in order to:

- provide pupils with an opportunity meet other peers and actively discuss science with them.
- give those pupils exposure to professionals in local STEM industries and time to showcase their science knowledge.
- give a different opportunity for STEM Ambassadors to work collectively with teachers and pupils on site.
- reach more schools in our area to help build local science knowledge.
- raise awareness of our BASF STEM ambassadors and the work they carry out.
- inspire us at BASF to help nurture the next generation of scientists!

Frances: *What are your reflections on the BASF GSSfS Stockport sharing event?*

Helen: Honestly, it was so much fun!

We had eight schools involved, who involved eight teachers and 64 pupils. All the schools brought investigations to share and there were nine in total, ranging from which rock type would be the best for a skate ramp to which is the best material to use for toilet paper! The diversity of the investigations blew us away! Some had used the *Great Guided Enquiries* so were sharing how they had used coloured sweets to model how the effect of climate change on ocean water temperature affects coral bleaching. It was just great.

The majority of the children were 8–11 years of age and their ability to describe their investigations, as well as the science behind, was phenomenal. I don't suppose I'd fully appreciated the depth of learning that GSSfS could inspire, and the interest the pupils genuinely had to talk to others outside of their own environment about it.

I remember one child explaining how her class had developed their experiment (how does the material an aeroplane is made from impact how long it stays in the air?) and the infectious enthusiasm that radiated from her as she explained how they had run it and some of the surprising results they got.

Our team of BASF STEM Ambassadors came along to support, and we had a great time questioning the various teams on their techniques and results. Watching the pupils interact with peers from different schools, whom they had never met, about their questions, methods and findings was a real highlight. The added bonus was that they got hands-on with eight other investigations shared by others. It's such a simple concept – to share – and so powerful when you see young children doing it so well. *It certainly inspired us at BASF to continue efforts to help nurture the next generation of scientists!*

Pupils demonstrate the different types of rocks that can be used for a skateboard ramp and invite thoughts on which will be the best option

Frances: *What support did you find valuable from the GSSfS team and web resources?*

Helen: I had run several GSSfS experiments at my children's school in past years so was already aware of the huge array of experiment ideas and resources that are available on the GSSfS webpage. Lynne Bianchi came along to our BASF Societal Engagement conference in 2023 and provided us with some great input and feedback on our work. In reality the key to our success this year was the partnership between ourselves, the GSSfS team and the schools.

Faye Garner, Science Lead at St Matthew's Primary School explains the nature of working in partnership with BASF.

We got involved with the BASF team in March 2023 for our STEM Week. STEM Ambassadors came into school to run hands-on experiments linked to the curriculum. The pupils enjoyed having learning reinforced in a practical way, for instance modelling the digestive system using tights and food. They also engaged in experiments that linked to BASF's industrial applications, in particular the colour lab work which gives the children chance to create their own bespoke car paint colour, and worm charming to explain the importance of soil health in food production. This really gave pupils, and us as teachers, a better understanding of what BASF did as a company and how their work influenced our lives.

As a result, the STEM Week had a massive impact on our pupils and they got to experience things they normally wouldn't have. The pupils found the BASF STEM Ambassadors were inspirational to be around and learn from.

When we then found out that BASF would be hosting GSSfS nearby we jumped at the opportunity to get involved. Our Year 3 class had a great time coming up with ideas for our investigations, and they eventually decided that they wanted to investigate whether all flowers were the same using microscopes. They seemed fascinated in looking at the different parts of various plant types and finding patterns. Eight children attended the event on the day and presented the investigation to others, whilst the rest of the class took part in the activity in school. What I noticed was how they not only had a wonderful time but really gained confidence in explaining their ideas to other children and to industry professionals.

Societal engagement is a volunteer role for everyone at BASF and it has to fit around our day job. To get an event like GSSfS off the ground would not have been possible to do alone so teamwork was essential. I sourced the event space via Stockport Council and dealt with the insurance and risk assessment angles. The GSSfS team leveraged their contacts with local schools to invite them along and deal with all the event admin, and Hannah Ridgeway (science lead at Vernon Park Primary, a local school) ran the sessions for teachers to ensure they had support through the planning and experiment stages.

The GSSfS team have been so supportive throughout the whole process and have taken on so much of the burden of organising that I would invite other organisations to have a go at running their own GSSfS sessions next year, it's easy!

> *'The Stockport GSSfS event has been fantastic for our pupils to be involved with. They have gained so much from being able to communicate in different ways to a variety of people about their science investigations.'* Teacher, Outwood Primary School, Stockport.

Hannah Ridgway, Science Lead at Vernon Park Primary School describes her experience working with BASF and the GSSfS

Frances: *How did you initially get involved with GSSfS?*

Hannah: My school had been involved with Great Science Share for Schools for a few years before I joined; we always run our own internal event where every class shares a question on the playground. I first became involved with Great Science Share for Schools in 2021. I was looking for opportunities to raise the profile of science in our curriculum and to make it feel real and relevant to our children. When I looked more into GSSfS and its ethos of pupil-led questions and sharing investigations, it felt like a perfect fit.

The ASPIRES research from King's College London shows that building science capital is crucial if we want all pupils to see science as something for them. GSSfS, especially with industry links like BASF, does exactly that.

Our school serves a community with significant levels of deprivation, and many of our pupils have very little

experience of science beyond the classroom. The idea that they could ask their own questions, investigate them and then share with a wider audience was incredibly powerful. The EEF's *Improving Primary Science Guidance* (2023) highlights that encouraging pupils to ask questions, plan their own investigations and explain findings are high-impact strategies for building scientific understanding. Furthermore, Ofsted's 2021 Science Research Review emphasises that high-quality science education develops pupils' ability to work scientifically and connects learning to real-world contexts. All of these are core values of GSSfS.

Frances: *What are the benefits of Stockport hosting its own event?*

Hannah: Having a Stockport-based event this year was absolutely fantastic. Previously, travel had been a significant barrier for some schools, particularly those in more deprived areas like ours. A local event meant we could take more pupils to share their work without worrying about long journeys or additional costs.

It also created a real sense of community. Seeing other Stockport schools, local teachers and industry partners like BASF in one place made it feel like a celebration of our children and our area. As a teacher, it was brilliant CPD; I got to see examples of good practice, inspiring investigations and creative ways of approaching pupil-led enquiry that I could take back into my own classroom. The EEF's *Putting Evidence to Work – A School's Guide to Implementation* emphasises the importance of professional development that includes seeing practice in context and learning from peers – the Stockport event allowed exactly that.

Frances: *What did your pupils gain from taking part?*

Hannah: The gains are huge. In science terms, they learn how to ask meaningful questions, plan and carry out investigations, and communicate their findings clearly, all key skills for the curriculum and beyond. But beyond that, they grow in confidence. They see themselves as scientists, which is something we actively try to develop in our school.

For many of our pupils, opportunities like this are rare. By hosting our own event and then attending the larger Stockport one, every child in Key Stage 2 has a chance to stand up and share something they've worked hard on. Seeing children grow in confidence as they explain their science to others is incredibly rewarding as a teacher. The pride on their faces is incredible. It also builds teamwork, presentation skills and curiosity: qualities that go well beyond science. Ofsted's *Science Research Review* (2021) notes that high-quality science education should foster a sense of excitement and curiosity, and this event does exactly that. The EEF's research into pupil engagement also shows that giving pupils ownership and an authentic audience increases motivation and resilience.

Knowing that people who work in science day-in, day-out would be there really raised the level of questioning. Pupils thought carefully about choosing questions that felt relevant and impactful. They wanted to be able to explain not just what they found out but why it mattered.

BASF's input also helped pupils make links between their classroom work and real industrial processes. For example, when we explored materials and changes, pupils linked their investigations to products and processes BASF work with, which gave their projects a sense of purpose.

Having BASF involved was fantastic too! When pupils know that scientists from a global company are interested in their questions, it instantly raises the stakes in a positive way. They took more care with their investigations, thought more deeply about their methods, and were far more confident when it came to presenting their findings.

One group of Year 6 pupils told me afterwards, '*I didn't think scientists would want to hear what we think – but they did!*' That sense of validation is priceless. The Wellcome Trust's *Science Education Tracker* (2020) found that pupils' engagement increases when they see how science applies to real jobs and problems. Having BASF there made that connection very real for them.

Frances: *What would you say to other Stockport schools that are interested?*

Hannah: I would say: absolutely go for it. Hosting your own event doesn't have to be complicated, start small if you need to. The Great Science Share team provide brilliant resources and support, and the emphasis on pupil-led questions means that it grows naturally out of what your children are curious about.

For me, one of the most rewarding parts is watching children who might normally be quiet in class grow in confidence as they share their science with others. Seeing them proudly present their ideas makes all the planning worthwhile.

This echoes the EEF's guidance on building partnerships beyond school to enrich learning, particularly in communities with limited exposure to STEM careers, and supports the *Gatsby Benchmark* of linking curriculum learning to real-world opportunities.

Frances: *What is the future potential for GSSfS with BASF?*

Helen: We would love to continue to support GSSfS and to host an even bigger event in 2026. The feedback from all those involved was so positive. We recognise that should we achieve that ambition we'll quickly need a larger space to host it, so we have approached the local council and Stockport Council have kindly offered a large space in the Stockport Exchange building.

I suppose it's important not to forget to say how that key factors such as accessibility of the space, safeguarding, transport and timing all affect the way schools eventually engage. We followed the format of a sharing event as promoted by the GSSfS team and worked with the teachers to ensure that all risk assessments were in place and that everyone had confidence. Working together with the GSSfS team, responding to their advice and having the prior relationships with local science lead teachers all enabled us to work collaboratively to achieve a really positive outcome.

> *'I would highly recommend getting involved in GSSfS to anyone in the STEM industry who may be considering it. BASF have been a sponsor since its early days but hosting a GSSfS event here in Stockport has really brought home the real benefits that such a local event can bring to the community around our offices. Colleagues loved spending an afternoon questioning local children who, in turn, clearly benefitted from interacting with industry professionals. Showcasing our industry in an accessible and exciting way helps to highlight both our work at BASF and our industry more widely and hopefully, will encourage more young people to consider a STEM career.'* Darren Budd, Managing Director of BASF plc

BASF STEM ambassadors listening to pupils explain how they came up with and ran their GSSfS experiment

Getting involved

Interested in getting involved?

For more information on how to get involved and potentially run your own GSSfS Share event, visit www.greatscienceshare.org to download a copy of *A guide to getting involved.*

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They say sometimes the first step of a journey is the hardest

James Anderson and **Brendan Fox** reflect on the value and process of Great Science Share for Schools to teachers and children within Manchester Hospital School

As science teachers at Manchester Hospital School, we believe we have one of the best jobs in education. For our staff there is no such thing as a typical day. It is fast-paced and varied. We teach pupils who can't attend their regular school because of their physical or mental health.

We have a range of sites which focus on differing patient needs from supporting pupils undergoing Proton Beam Therapy at the Christie Hospital, a tier 4 residential unit for pupils recovering from mental health illness, the Royal Manchester Children's Hospital where children could be inpatients for a whole range of health conditions or our Leo Kelly school for young people who are reintegrating to mainstream education.

In the Royal Manchester Children's Hospital setting our 'classroom' is often a hospital ward, and our pupils are patients. It's a very different environment, but the goal is the same: *to provide a high-quality education, removing barriers and helping pupils engage with scientific practice.* You might see us navigating the corridors of the hospital with our trolleys, which is like a mobile science lab packed with microscopes, models of the human body, and even Virtual Reality headsets. We tailor lessons to the learning the pupil needs while considering the curriculum with their regular school. This helps them stay on track with their peers and makes their return to school a smoother transition.

Shared values with GSSfS

Being a hospital schoolteacher means being flexible, caring, and quick on your feet. Our pupils and their families are dealing with a lot, so we try to provide a 'slice of normal' in their day. The open nature of GSSfS and the way it is adaptable meant that we didn't feel constrained by specific rules and regulations, but that we could take the child-led enquiry focus and blend it into our learning programmes, somewhat seamlessly. We considered how we might focus on a lesson on the solar system, or the respiratory system or it could be a simple experiment to explain the signs of a chemical reaction. In working closely and collaboratively with nurses, doctors and the play team, we found GSSfS contributed well to our approach in making each child's stay a supportive experience.

The fun, hands-on science projects that we usually include in our enrichment activities, like our STEM Club, were a key focus as we constructed a plan for GSSfS, with practical learning such as building small catapults enhancing learning about physics or creating simple circuits consolidating understanding about electricity. Our shared goals of keeping pupils curious and passionate about learning, even when they are significantly unwell, made it clear that this was a good fit.

> *'Shared projects and joint learning experiences such as the Great Science Share allow pupils to connect, support one another and recognise that they are not alone but are part of a wider network of learners facing and overcoming similar challenges. For staff, collaboration offers opportunities to exchange expertise, share resources and strengthen professional practice; ultimately enriching the learning experiences offered in every hospital setting.'* Cath Kitchen, Chair, Hospital School Network (NAHE)

GSSfS as a vehicle for cross-school collaboration

Over the past two years we've wanted to build and build on our previous experiences. The 2025 theme of Connected Science inspired us to find a variety of ways for pupils to connect with peers beyond their ward or classroom to share their voyage of scientific discovery.

We had established contact with Oxfordshire Hospital School to look at professional development and good practice in hospital teaching, and it seemed a natural next step to link our pupils together. The Great Science Share for Schools campaign provided the ideal vehicle for this. We were so pleased when Liz, the science lead in Oxfordshire Hospital School, agreed to be involved.

Using recent research on '*Purposeful practical work in primary science*' (Earle *et al*, 2025) we agreed to focus on hands-on scientific engagement-based activities which would allow pupils to develop their 'working scientifically' practices, expanding their scientific vocabulary and using the assess, plan, do, review cycle.

Each of our teachers chose activities suited to the curriculum stage and development of their pupils. These ranged from modelling the circulatory and respiratory system, viewing cells and structures under the light microscope, building 3D representations of our solar system and investigating renewable power generation.

Steps to success

Step 1: Will it be too difficult?

This was the first question we asked ourselves when our headteacher found out about the campaign. Initially it is easy to think that these types of collaborative events would be hard to plan and deliver in our setting due to logistics.

NAHE has a clear vision: access to science for all pupils in hospitals and a learning community that thrives on high aspirations, connection and shared purpose. Through this innovation, partnership and an unwavering belief in equal opportunities, hospital schools can ensure that science education continues to inspire and empower every pupil in their care, as these case studies illustrate.

https://www.nahe.org.uk/

Inclusivity was core in everything we did, so the answer was 'We'll find a way!' as we explored how we could make the campaign work for our teachers and pupils.

Step 2: So many ideas – which is the best for us?

The *Great Guided Enquiries* are packed full of hands-on sensory engagement ideas linking to themes and real-world contexts as a basis for scientific investigation. We discussed as a staff team how these might work in the hospital: these needed to be experiments which we could take around the hospital and our other sites. We quickly decided we wanted to make a celebration event to bring the wonder and awe of science to the fore.

Investigation questions we took forward were:

Fruit Batteries Investigations

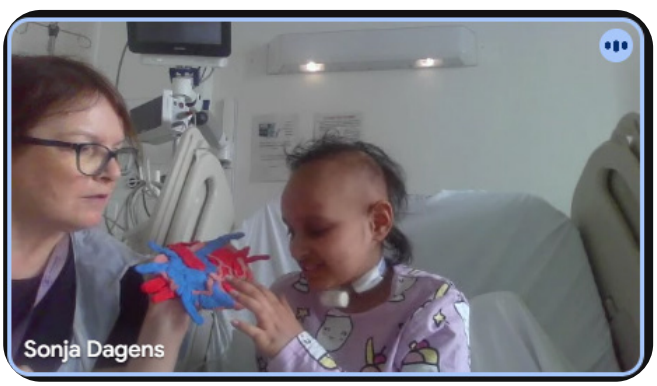
- Does the number of lemons affect the total voltage produced in fruit batteries?
- How does the material used for electrodes affect the voltage produced?
- How does the type of fruit affect the amount of electricity produced?

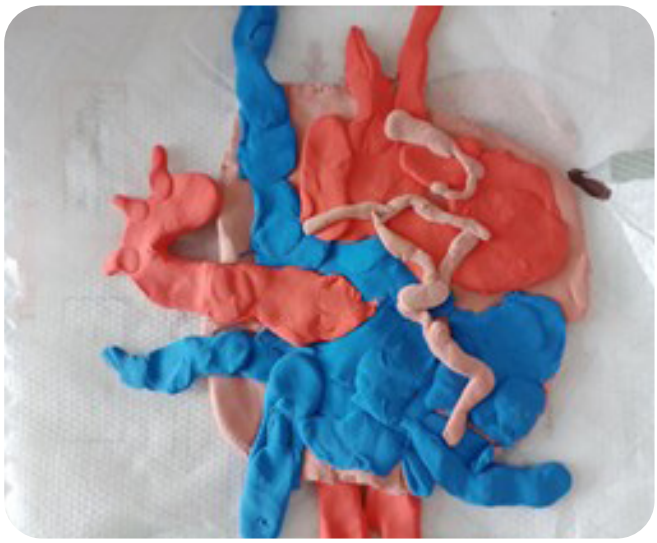
Lava Lamp Investigations

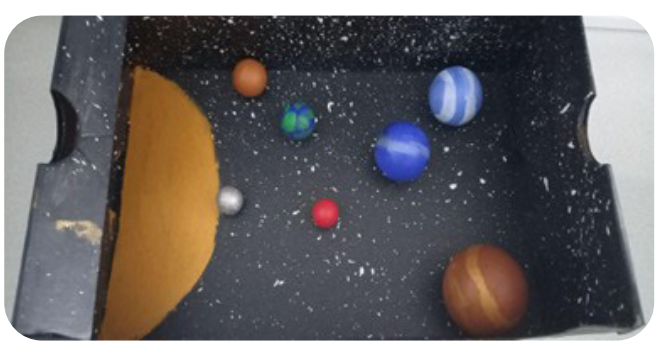
- How do different substances affect the amount of fizz from the effervescent tablet?
- How does the size and number of the table affect the number of lava blobs produced in five minutes?
- How does the temperature of water affect the reaction rate and movement of bubbles?
- Does the amount of water and oil affect the movement of blobs?

Water Bag Investigations

- How does the type of bag affect whether the water leaks when the bag is punctured?
- How does the shape of the object affect the seal?

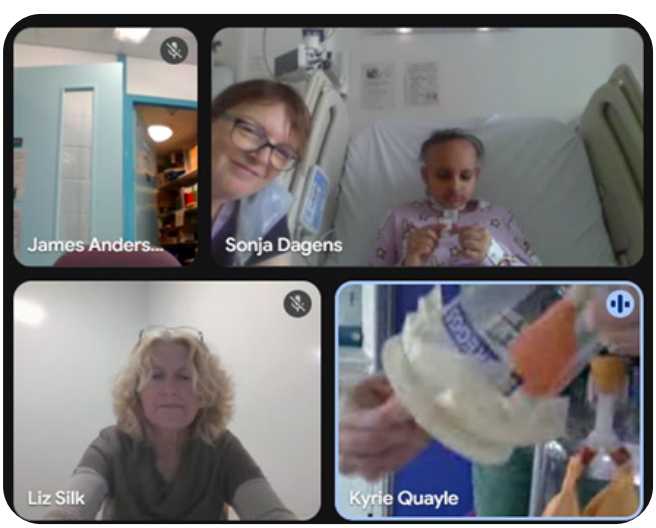






Step 3: Sharing science – overcoming the odds

In our first year we photographed and recorded our activities so that our pupils' work could be shared with pupils in other participating schools. In 2025, we used *Google Meet* as a platform to set up our virtual science share and agreed our day and time for 'the big meet'. We felt nervous about how our pupils might react to being in a virtual classroom with other pupils they didn't know, for many of our pupils they had not been in a 'classroom' for some time. It was this feeling of isolation and difference which we hoped to break down. We needn't have worried, the pupils were fantastic, some a little shy at first but as we introduced ourselves from each of our settings it became clear that there was much more common ground than there was difference. For some of our pupils, seeing others



Sharing with new audiences through *Google Meet*!

in their situation helped to make them feel part of something bigger and not as an individual in a ward separate from the world. A pupil explained how she had created a model of the lungs using modelling clay, one pupil showed us their 3D solar systems, one created from a shoe box and polystyrene balls, the other from a toilet roll! Another pupil displayed pictures of objects from the sensory garden viewed through the microscope and quizzed us on which each image might be.

Lessons learned: what's our message to you... whichever setting you are in!

After our initial reservations were put aside and we took the plunge to participate in the Great Science Share we learned that sometimes taking a risk and trying new things can bring unexpected rewards. While it is often easy to see the potential barriers, for example complying with strict hospital safety and infection control protocols, the positives can significantly outweigh the difficulties. Being able to explain to the children that they were involved in the Great Science Share along with pupils across the country and internationally gave them a sense of connection to life outside the ward, a feeling of being part of something and reducing their isolation. For us, practical experiments and the highly visual and hands-on nature of science sparks the natural curiosity of students, who may be otherwise withdrawn due to their illness and helps to normalise the hospital environment for our students.

The immense therapeutic value of this hands-on science experience provided a powerful, positive distraction from pain, fear and boredom, helping to reduce anxiety associated with being in a hospital.

High hopes for the future

We are privileged in hospital education to work with inspiring children and families who walk tremendously difficult paths every day.

It's a challenging job, but it's also incredibly rewarding. Seeing a young person's face light up when they understand a new concept, or when they're able to escape into a lesson for a little while is a powerful reminder of why we're here. We're not just teachers; we're a source of support, stability and normalcy for families whose worlds have been turned upside down.

I always marvel at their bravery and remind myself that when something may seem difficult and daunting my first step pales into insignificance compared to these wonderful young people I meet. We are on our Great Science Share journey and we hope to branch out further in the future linking with all the hospital schools nationally and perhaps, in time, even internationally to share not only science and learning but community and connection. We look forward to seeing how our science share grows in 2026 and beyond.

> *'Linking with other hospital school science teams is always an inspiring way to share ideas on the challenge of teaching science in different settings, whether teaching bedside or in other teaching spaces where science equipment is limited! The chance to join the Great Science Share is a lovely opportunity for the OHS to link with the MHS, and for us all to see what our staff and pupils are doing in science.'* Liz Silk, Science Lead, Oxfordshire Hospital School

> *'Being in a classroom can be a daunting experience for these young people. The practical elements of the Great Science Share and nurturing environment help to develop the young person's sense of wellness and support their overall progress.'* Kirsten Taylor, Lead Occupational Therapist, Galaxy House

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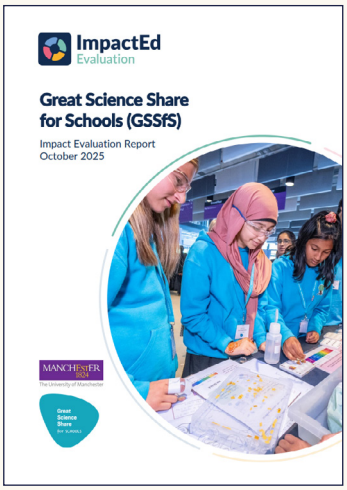
Impact beyond the numbers!



Measuring the reach of Great Science Share for Schools is the easy bit! Registrations enable the team to know how many pupils are signed up, how old they are, where they are in the world, and our website analytics give valuable insights into engagement with the campaign resources.

What we really wanted to uncover, in addition to this, was how does the campaign have an impact on those taking part – on the quality of science in schools. Is Great Science Share for Schools making a difference how we set out for it to do?

For that reason, GSSfS has worked with ImpactEd to externally evaluate impact on pupils. Data was collected from 448 pupils across six primary schools, with outcomes such as resilience, metacognition and openness being measured and compared against comparison groups. This 2025 report follows on from previous evaluation, again conducted by ImpactEd, in 2019.

So, what do the results show?

- Pupils participating in GSSfS scored 6% higher than matched comparison groups for **resilience**
- Outcomes for GSSfS pupils were relatively **even across male and female pupils and across socio-economic groups**, including those from the most deprived postcodes. This mirrors 2019 findings and suggests that GSSfS is bucking the trend in terms of widening access to science and engineering for all.
- GSSfS pupils are more likely to engage in reflexive, self-questioning behaviour during their learning process

To read the full report, visit:
www.greatscienceshare.org/aboutus

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