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

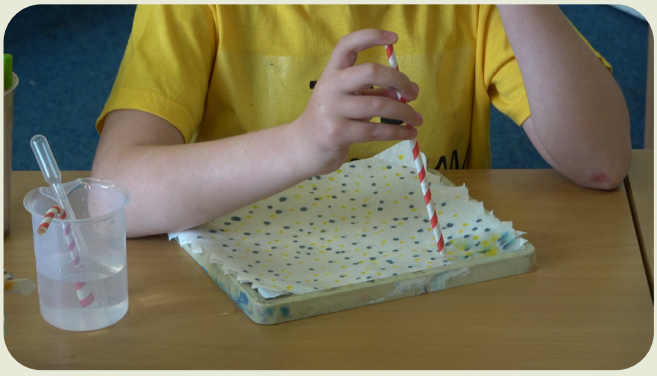
In addition to their STEM Advisory service in Scotland, SSERC has been providing online interactive professional learning for over 15 years. This well-established model offers practitioners access to a mix of guided science investigations, activities and discussions, taking part alongside colleagues 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?

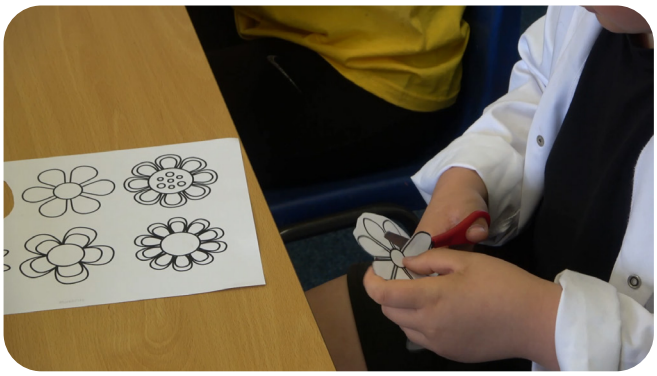
Which coloured inks travel the furthest and why?

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.

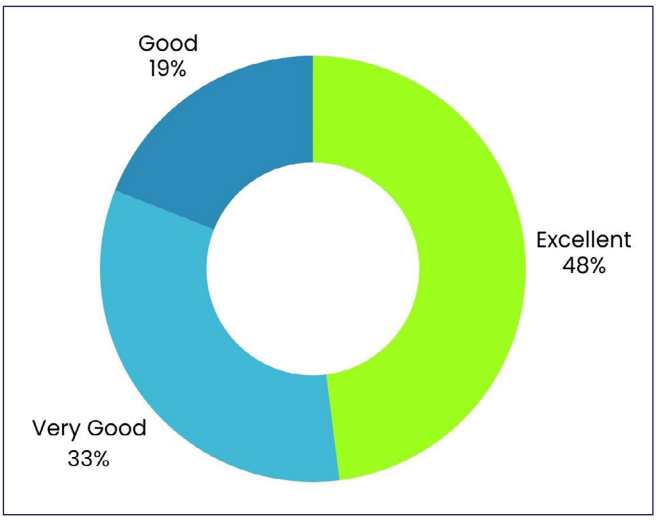
Making an impact

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*?



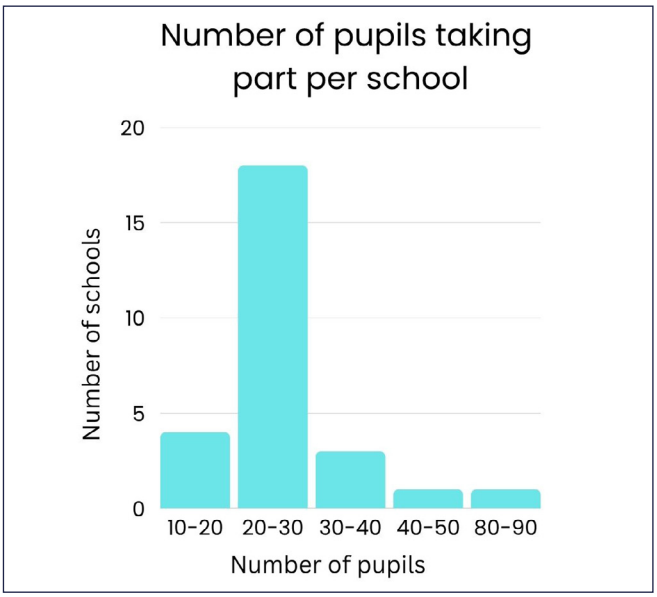
*Pupils were offered a choice of Excellent, Very Good, Good, Okay, Not Very Good

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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Hayley Sherrard
Senior Education Manager at SSERC.
Hayley.Sherrard@sserc.scot

Joanne Jarvie
Teacher at Thornton Primary, near Kirkaldy.
thorntonps.enquiries@fife.gov.uk