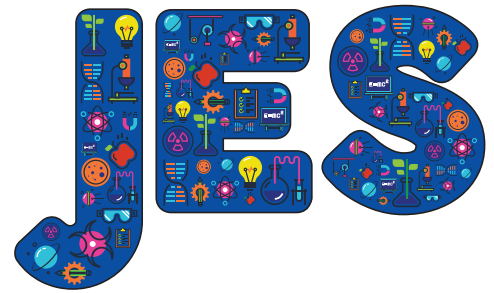


# Science through stories



● Nicola Connor

## Abstract

*This article considers three case studies of practitioners and primary pupils using narrative or creative outputs to share their science learning. It looks at using stories as a stimulus to engage pupils with science learning and teaching within Scotland's Curriculum for Excellence (Scottish Government, 2010) across the early years (Early level) and primary (First and Second level) age range. The study considers examples of practitioner planning sequences, to demonstrate what such an approach looks like in practice. The story stimulus and learning outcomes for pupils are explored, together with feedback from teachers. The study found that allowing pupils to choose how to share their knowledge and understanding of science in creative ways can help to support developing their literacy skills, not just in the genre of report writing.*

**Keywords:** Storybooks, communicating learning, story stimulus, practitioner research

## Introduction

I am a class teacher from Peel Primary School in West Lothian, currently seconded out of class as part of the Raising Aspirations in Science Education (RAISE) programme (see weblink below). I have been supporting teachers and schools across West Lothian since taking part in the SSERC primary cluster professional learning programme in 2016-2017 (see weblink below).

Whilst working as RAISE Primary Science Development Officer during the COVID-19 school

closures, we considered an agile approach to learning, with child-led project-based home learning and teacher as facilitator. Whilst considering what an agile approach would look like in practice, I was challenged 'to create a wordless text' with my STEM hat on. I created a short animation, sharing a science experiment through a story. You can view my learning journey and final video here:

<https://sway.office.com/EBgSMkPQkvjeajtk?ref=Link>

After developing the idea in theory, I then considered how this could be put into practice with pupils.

All teachers and classes involved in this project were part of the planning and discussion before and after the lessons. This was to ensure that science topics covered were part of the teacher/school's curriculum framework and planning for the term, so that it was not seen as an 'add-on'. This small 'test of change' research project will be of interest to staff considering creative ways for children to recount science lessons, or how pupils can apply literacy skills through a relevant science context.

## Rationale

Stories and picture books have always been a great hook for starting a science lesson and allowing pupils to see the relevance of the context in which they are learning. However, often the literacy follow-up to a science investigation would be to support report writing. Whilst there is a place for pupils to learn the genre of report writing, and tying in with science lessons is a great opportunity, I wondered if there was an opportunity for pupils to develop other literacy skills and genres through science lessons. The purpose of this research



project was to consider how pupils could recount their science investigation and outcomes through stories, or a child-led creative output, rather than writing a standard science report.

Science communicators use stories as a meaningful context and an effective way to communicate with an audience, as stories are integral to all cultures. Studies such as Walan (2019), Walan and Enochsson (2019) and Coulter *et al* (2007) indicate that stories help audiences to process and recall new information. Within Curriculum for Excellence literacy experiences and outcomes (Education Scotland, 2018), 'recounting' involves students orally reconstructing a story, where teachers can use recount to assess how well students comprehend and can support pupils to develop a deeper understanding of what they have read. Using recount within a science lesson, this project sought to find out if pupils could recount their investigation and outcomes, ensuring that they included the important details and in the correct sequence.

For this research project, classes of around 20-30 pupils from each of Scotland's Curriculum for Excellence levels in three schools were used – Primary 1 (ages 4-5, Early level), Primary 3 (ages 6-7, First Level) and Primary 6 (ages 9-10, Second level) – to show how this could be developed across a school and the progression of skills used.

### Case study: School 1 – Kirknewton Primary

The project started at Kirknewton Primary, which has 190 pupils. Primary 6 were learning about energy and forces, Primary 3 about suitable materials linked to habitats, and Primary 1 were starting to learn about forces. For the research project, picture books were selected to consider if and how these can be used from P1-P7 for different purposes.

Primary 6 listened to a story called *When a Leaf Blew In* by Steve Metzger; they were asked to consider the sequence of the story and how to describe the 'chain reaction' of events. The children were then asked to create their own chain reactions, with the challenge of only using what they could find in their classroom. The chain reaction of events needed to have a purpose,

similar to the 'Goldberg machines', of completing the chain by putting a ball into a cup. They worked in small groups to make their chain reaction and then to create their recount. Some children chose to write instructions using procedural writing on how to set up a chain reaction. Some groups created news reports, filmed on a device, recounting their investigation. These groups took it in turns to say what their chain reaction was, if it worked or didn't, and why. They also included reflections such as '*the material we used wasn't suitable so we changed it*', '*we had to problem-solve how to build a reaction around a corner, I'll hand over to X to explain how we achieved this*' and '*we worked well as a team as we listened to each other's ideas*'. These reflections on their collaborative process may not have been discussed or highlighted if writing an individual report.

Primary 3 listened to the story *Hibernation Station* by Michelle Meadows, linking to an investigation around natural/human-made materials to make the best habitat for a hibernating dormouse. For Primary 3, it was decided to give them a story starter to help support their narrative writing: '*Dotty the Dormouse was looking for materials for her shelter to keep her warm during hibernation. She...*'. Children wrote a plan for their story in groups or pairs, discussing the investigation that they had carried out. This writing was also continued in their literacy lesson time for the following day. Children supported each other in the recount of the investigation and, technically, in the writing/phonics of the story too. However, whilst looking through the books created, two pupils had written an index page for their narrative piece. This highlighted to the class teacher that some aspects of features of a fiction/non-fiction text needed to be revisited or consolidated at a later stage. This would not have been highlighted through a report writing session.

Primary 1 listened to the story *And Everyone Shouted Pull* by Claire Llewellyn. As there was a play-based pedagogy approach in this classroom, an adult-initiated, open-ended challenge was posed. Could children create a cart that could be pushed or pulled using loose parts in the classroom? Pupils used a storyboard template to draw/write the recount of what they created and how it worked, making sure that they included a beginning, middle and end. This would help pupils



to recount their learning process, but also to tie in narrative writing skills, considering in a story what happened at the start, middle and end.

Feedback from across the classes showed that almost all of the children said that they felt the story helped them with their investigations. One Primary 6 pupil stated that *'they thought about the story as they created their chain reaction'*. They all enjoyed recounting their investigations in different ways, using their 'own voice'.

### Case Study: School 2 – St. Anthony's Primary

The project then moved onto St. Anthony's Primary, which has 223 pupils and is in Armadale, West Lothian. Primary 6 were learning about sustainable energy and forces, Primary 3 about space and the movement of the Sun, and Primary 1 were starting to learn about forces. Whilst working with classes on this project, I was also supporting the whole school staff through staff professional learning around practical science at all levels.

Primary 6 listened to a story called *The Boy Who Harnessed the Wind* by William Kamkwamba and Bryan Mealer. Classes discussed sustainability and creating wind turbines (Figure 1) and harnessed their energy to power a mechanism– in this case a basket on a thread to pull up. Both Primary 6 teachers decided to take the series of lessons forward themselves, without remote teaching support. This allowed them to carry out the lessons over the series of afternoons. The teachers' feedback included: *'Throughout the activities the children were engaged and on task'* and *'We were more than impressed with the final products that the children produced'*. Feedback from the children included: *'I enjoyed the story about how William made a wind turbine'* and *'I liked investigating how the angles of the blade affected the rotation when we blew on it'*, showing not only that their literacy but also numeracy skills were being applied within their learning process.

Primary 3 listened to the story *The Black Rabbit* by Philippa Leathers. The classes discussed what caused shadows and what might make them change shape/size. The investigation carried out was to explore what made shadows change shape. This was carried out using small torches and a

classroom object, recording the shape/size of shadows as the torch moved. Pupils could choose one object, the position of the torch, and the distance of the torch from the object. The object was the variable that remained unchanged as they investigated moving the light around it. From this, pupils created cartoons or shadow puppets to recount what they found in their investigations. Teacher feedback included that they thought the

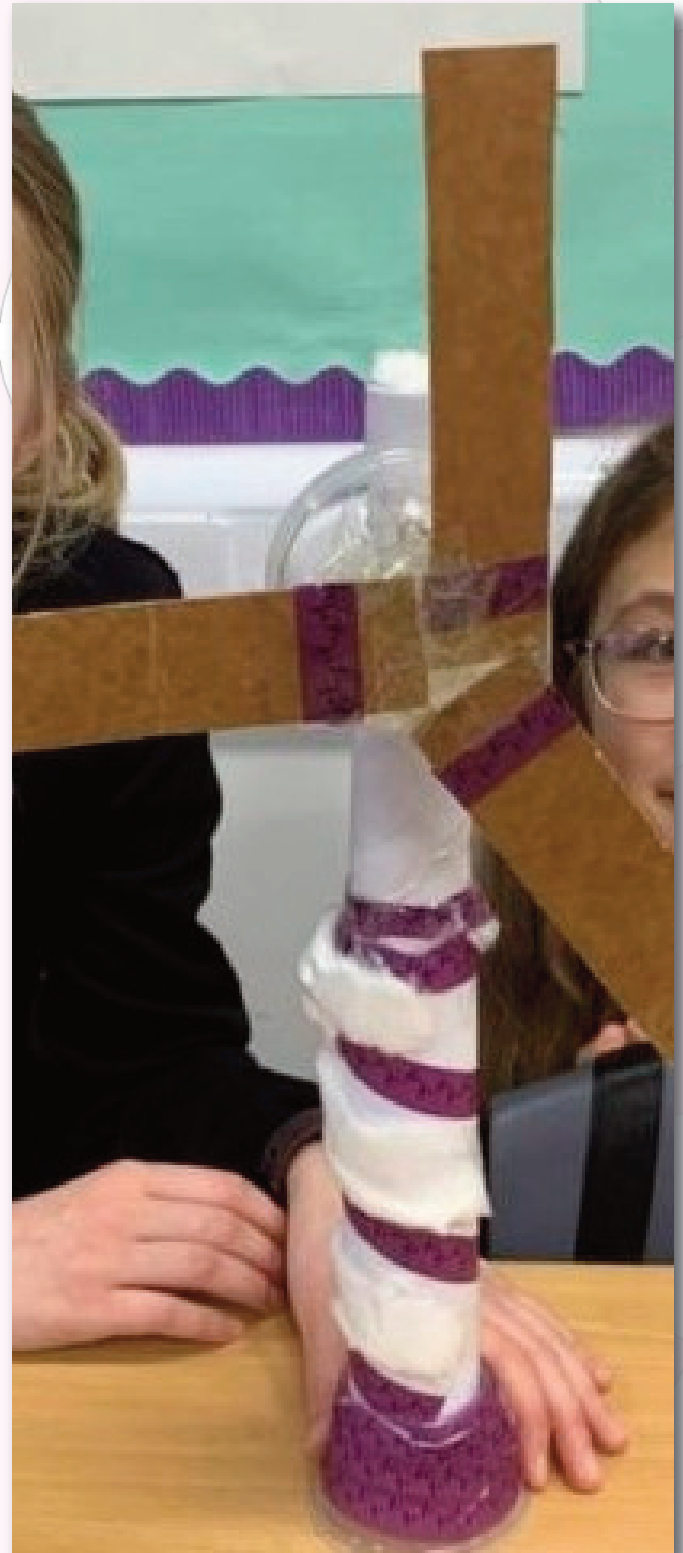


Figure 1. Wind turbine.

subject content, student engagement and participation were excellent. They thought that it was 'very beneficial giving children the choice of how they write up their experiment' and that they had learned 'to consider using stories as a stimulus, it really got the children talking and thinking'. Pupil feedback included that it was great to choose how they shared their learning and what they discovered.

Primary 1 started to learn about forces and listened to the story *And Everyone Shouted Pull* by Claire Llewellyn (as above). The class teacher led the lessons and this class decided to work in teams to plan, design and create a cart from the story, which they could push or pull. They then shared their designs, creations and orally retold their process with the rest of the class, ensuring a beginning, middle and end (Figure 2).

The teacher feedback included the positive approach to different literacy skills being applied and developed, not just recounting but also communication and presentation skills.

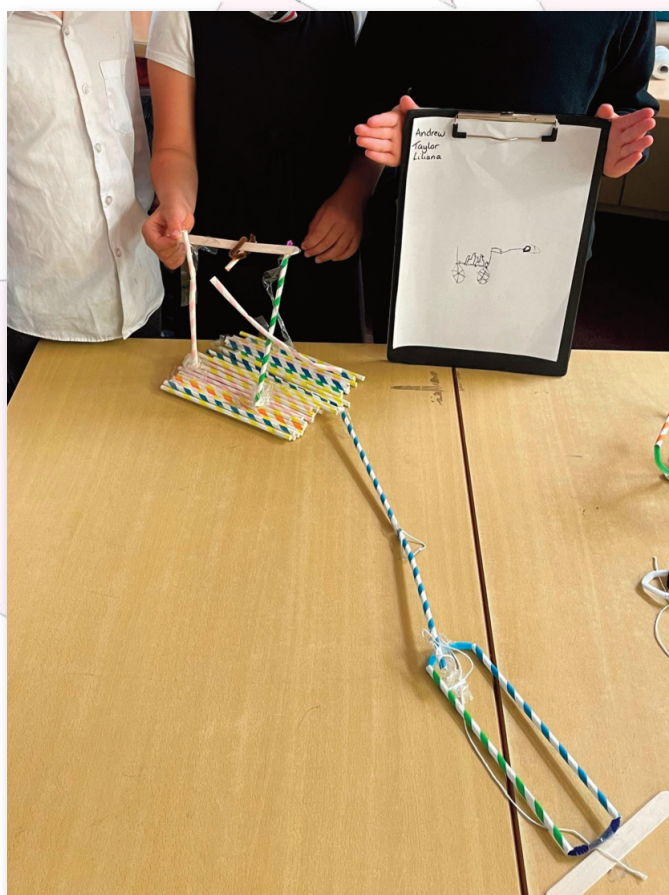


Figure 2. Designing a cart to push and pull.

### Case Study: School 3 – Peel Primary

Peel Primary School has 416 pupils and they decided to run the project as a whole school small test of change, rather than focusing on just 3 classes. I met with almost all stages within the school to help discuss their plans/ideas and offer ideas for resources and books to use. For this case study, however, I have kept the results of Primary 1 and Primary 6 to keep this case study consistent with the other schools' results.



Figure 3. Shadow puppets.

Primary 1 focused on electricity. They carried out a scavenger hunt at home on a seesaw to find out what they knew about electricity. They read the story *When Charlie McButton Lost Power* by Suzanne Collins and talked about what would happen if the electricity went off. A play pedagogical approach was used in this Primary 1 classroom and the child-led approach meant that the pupils decided they would use torches to create light, and they explored making shadow puppets (Figure 3). They also designed a light box and some characters to show what they would do in the dark. These scenes were shown in the dark box to look at and use for storytelling orally. Key vocabulary utilised within the story and investigations was evident in pupils' storytelling and used within the correct context.



Primary 6 started their learning by reading *Jack and the Giant's Peach*, a twist on *Jack and the Beanstalk* from Jules Pottle's *Science through Stories* book (2015). Primary 6 were learning about the life cycle of flowering plants, pollination and fruiting. Instead of narrative writing a recount, they decided to use procedural writing. This had been a focus in writing lessons, so they decided to apply their writing skills in the new context of their science learning. The pupil feedback said that they liked the way the story introduced the science topic, allowed them to explore the life cycle through drama and linked to the art they carried out. The teacher's reflection was that she would like to refer back to the story, possibly through a display, getting the pupils to make a display of the life cycle stages with story bubbles of what was happening in the story at that time. She would use these series of lessons again, adding in her reflections as a next step with future classes.

## Impact

Due to COVID-19, these lessons were supported remotely. This meant that I worked in different ways with each class, whether remotely supporting the teacher with planning or remotely with the class and team teaching a lesson through Microsoft Teams.

This study highlights where appropriate science investigations can be retold in a creative, child-led way. I found that the approach could help highlight gaps in learning and so be used to inform formative assessments. For example, in Kirknewton's Primary 3 class, pupils mixed up the features of a fiction/non-fiction text, allowing the teacher to revisit at a later stage. Using storyboards in Primary 1 helped to see whether pupils could sequence in the correct order and include a beginning/middle/end, developing their skills in retelling and narrative writing. The teacher of Primary 6 using chain reactions felt, during the news reports, that knowing her learners, they gave more detail and clarified thinking than if asked to write it down. Thus, in this project, I found that using stories as a stimulus can help to both engage pupils initially with the concept and, by retelling a science investigation, they can also develop their literacy skills in a relevant, meaningful context.

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