



LET
THEM
GO

'The best bit was learning how to work together'

GIVING CHILDREN OWNERSHIP OF THEIR SCIENCE INVESTIGATIONS IS EASIER THAN YOU MIGHT THINK

Bridget Holligan believes that giving children more control over what and how they investigate can really engage and motivate them in science but how do you make it manageable?

Giving children more ownership of their science investigations can really increase their enthusiasm for the subject. In turn, this can help with the effective teaching and learning of scientific enquiry and increase the scope for science to be used as a basis for cross-curricular work and for the development of literacy and numeracy skills. It also enables children to see science as something genuinely creative and not just following a set of instructions to get the 'right' answer:

I didn't really enjoy science before. I

like to choose what we do; it's more fun. Usually we are set an investigation and have to follow instructions. Now we can enjoy the mystery of not knowing what will happen. (11-year-old)

The best bit was doing something that other people wouldn't have thought of. (9-year-old)

The best bit was learning how to work together. We got on really well and we don't have to be best friends to work well together. We found out that we were all good at different things. (11-year-old)

Box 1 lists some examples of possible topics for pupil-led investigation.

Key words:
Ownership
Types of activity
Creativity



'Now I know you can do an experiment with normal stuff'

offered to extend this support to other parts of the UK and Science Oxford is working to see whether other organisations are interested in running a Big Science Event in their area.

How it works in school

The first stage of the competition involves the schools selecting their own winners. Schools with multiple entries from entire year groups or key stages often choose to display the projects/posters at their own 'science fair' and set up their own team of judges to select winners.

School approaches to participation are varied: some schools use the competition as a way of allowing their science enthusiasts to develop a project that interests them, often set as homework. Others use it as a focus for a series of after-school science club sessions. Increasingly, however, schools are becoming more ambitious with their involvement, choosing to use the competition as a way to involve whole year groups, key stages and even the whole school:

It was good to get the whole school talking about science and to see even our very smallest children choosing what to investigate. (teacher)

Coordinating the Big Science Event in school has allowed me to get to know children across a wider age range, which has increased children's interest in after-school science club. (teacher)

We are now doing a 'Big Science Event' style experiment three times a year. (teacher)

Making it manageable

Many teachers are understandably cautious about allowing pupils to develop their own ideas for science investigations. Indeed, when Science Oxford carried out a project with a class of 10- and 11-year-olds, the pupils' initial list of topics included acids, explosions, air cannons and aeroplanes! Fortunately, there are ways in which a teacher can guide this process so that it is

The 'Big Science Event'

For three years, Science Oxford (see *Websites*) has run a competition for local primary schools that aims to encourage more pupil-led approaches to creative science investigations. This is known as the 'Big Science Event'. In 2012, a total of 5600 pupils (drawn from across all

primary-aged children from 5 to 11 years old) from 40 local primary schools participated in the competition. The 2012 competition was supported by Playforce (see *Websites*), who provided a prize for the winning school (£1500 worth of outdoor play equipment) and gave several days of staff time to assist with judging. They have now

Box 1 Examples of topics for pupil-led investigations

Life processes and living things

- If you have longer legs can you jump further?
- Do ants like salty or sweet foods best?
- Does the size of jar matter for a bean to grow?
- Does the size of your hand affect your ability to tie your shoelaces?
- Do right-handed people clean the teeth on the left side better than the right?

Materials and their properties

- Which brand of toilet paper is stronger?
- What is the best biscuit to dunk into a cup of tea?
- What toppings kept our hot chocolate the warmest?
- Which fizzy drink freezes the quickest?
- Which fruit survives best after being dropped from a fire escape?

Physical processes

- What sort of stone makes the biggest splash?
- What material would make a good parachute for Batman?
- What is the best material to muffle a sound?

Box 2 Making it manageable

There are several steps you can take to ensure that this approach is manageable:

- **Ensure that pupils take responsibility for planning** any experiment designed to investigate a particular question. Thinking about how they will set up their experiment and what equipment and materials are available helps them to work out whether the idea is a good one. Older pupils can consider how they will keep it safe, what they will measure and how often, how they will keep it fair, how much time it will take and how they will record and display their results; this will often weed out some of the less practicable ideas.
- **Remember that chemicals are all around us** and we use (and eat) them all the time. If a group wants to do an experiment with 'acids' for example, this could just mean

working with lemon juice, vinegar and fizzy drinks.

- **Set the topic and ask pupils to suggest investigation questions that fit the theme.** This could be a science-related topic such as 'magnets', or a cross-curricular term topic such as 'islands'. Alternatively, you could ask pupils to think of investigation questions linked to a particular occasion, such as sports day, a school visit, field trip or residential trip.
- **Give all the pupils the same experiment to do** but allow different groups to change different variables and explore the effect, for example using paper helicopters, simple fliers or paper aeroplanes.
- **Give all the pupils the same investigation question to**

consider but allow them to design their own experiment in order to try to answer the question. For example, which brand of ketchup is the runniest? Or which liquid evaporates the quickest?

This kind of approach can also be managed by limiting the range and quantity of materials and equipment available to the pupils, especially consumables (something which affects scientists in real life too).

- **Invite some additional adults into school** to provide support for creative practical work or to help you to judge investigations if you want to run your own in-school competition. For example, STEM Ambassadors, a national volunteer programme coordinated by STEMNET (see *Websites*), is a good way to get science-trained volunteers in to help, or this could be a great opportunity to get parents more involved.

manageable, without stifling the pupils' creativity and enthusiasm (Box 2).

Cross-curricular opportunities

Creative science investigations can also provide a great basis for developing literacy and numeracy skills. They provide lots of opportunity for class discussion, speaking and listening, asking good questions, problem solving and effective teamwork. Pupils will need to take accurate measurements, understand units and make focused recordings. They will need to analyse their data and spot patterns and relationships. They will need to communicate their findings successfully to others, in a variety of ways, so that pupils, parents, teachers and judges can understand clearly what they have done and what they think they have found out:

I'm getting better at learning, even how to spell new words. Words like hypothesis and participant and

accurate. I feel like I've learnt a new language of science! (10-year-old)

The school uses projects like this to improve literacy and numeracy as well as to develop science enquiry skills. (head teacher)

It's a great opportunity to use and apply maths in a science context. (teacher)

Impact on pupils and teachers

Although no formal evaluation has been carried out, Science Oxford has collected feedback from pupils every year and

'Now we can enjoy the mystery of not knowing what will happen'



engages in conversations with pupils and teachers as part of the external judging process. Between them, staff, STEM Ambassadors and sponsors visit every winning team from each school prior to selecting the 10–12 teams that make it to the final event at Science Oxford Live. This engagement with pupils, together with discussion with teachers, has revealed a consistent picture about the impact on the pupils and teachers:

I thought science was about answering questions and remembering stuff and I didn't feel good at it. Now I know it's about having fun and discovering new stuff. (10-year-old)

Now I know you can do an experiment with normal stuff. I thought you could only do science with special equipment. (10-year-old)

I now understand just how much children like to choose what they will investigate. We need to give them the freedom to do this more often. (teacher)

I feel more confident about talking to the rest of the staff now about conducting experiments and sharing the ideas at a staff meeting. (teacher)

So why not have a go?

Allowing pupils to design their own science investigations or give more input to the ones you already have planned can bring

benefits to all of you. Let your pupils surprise and delight you with those questions that you would never think of and let them show you what they are really capable of achieving.

Science Oxford is happy to share its resources, ideas and supporting materials with any school or other organisation that would like to run their own Big Science Event. This includes investigation case studies, experiment planning sheets, our Big Science Event resource pack and copies of assessment and judging materials.

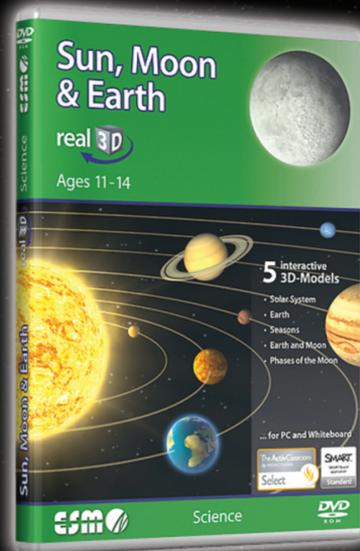
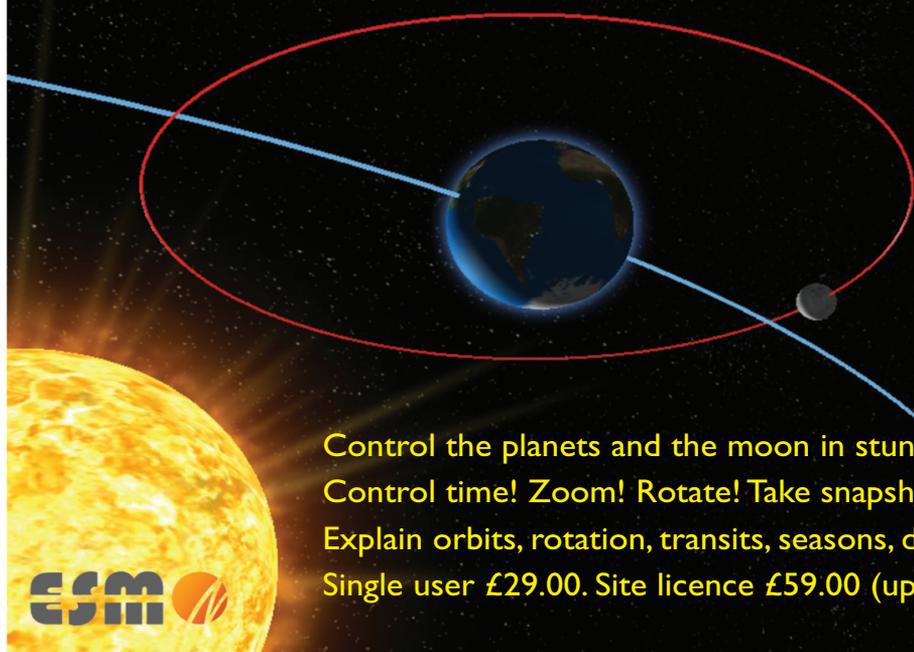
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