

# Guidance for Subject Leaders: Raising the Profile of Science



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## Acknowledgements

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# Introduction

Before introducing new strategies to teachers and children, you need to know what is going on in science across the whole school.

This **Subject Leader Self-evaluation Tool** can be downloaded from our Support for Subject Leaders webpage and may help you to audit science in your setting.

## SUBJECT LEADER SELF-EVALUATION TOOL

Working towards excellent teaching of science



WHOLE SCHOOL APPROACH	ROLE OF THE SUBJECT LEADER	RAISING THE PROFILE OF SCIENCE
<p><b>1. Timetable</b></p> <ul style="list-style-type: none"> <li>Is science taught weekly?</li> <li>How much time is allocated?</li> </ul> <p><b>2. Curriculum</b></p> <ul style="list-style-type: none"> <li>What are the statutory requirements?</li> <li>Do long and medium term plans show progression in both subject knowledge and enquiry skills?</li> <li>Are effective cross-curricular links made?</li> </ul> <p><b>3. Scientific literacy</b></p> <ul style="list-style-type: none"> <li>Are children using scientific vocabulary with understanding?</li> <li>Are children learning to reason and to explain their ideas?</li> </ul> <p><b>4. Science enquiry</b></p> <ul style="list-style-type: none"> <li>Are children taught enquiry skills?</li> <li>Do children regularly carry out practical investigations using a range of enquiry types?</li> </ul> <p><b>5. Differentiation</b></p> <ul style="list-style-type: none"> <li>Is every child's prior knowledge considered when teachers plan units of work?</li> <li>Do teachers adapt the pace, challenge and content of activities for pupils, including SEND and EAL?</li> <li>Are all children able to demonstrate their science skills and knowledge in an appropriate way?</li> </ul> <p><b>6. Assessment</b></p> <ul style="list-style-type: none"> <li>Are teachers using formative assessment to ensure children make progress with their subject knowledge and enquiry skills?</li> <li>Is summative teacher assessment reliable?</li> </ul> <p><b>7. Safe science</b></p> <ul style="list-style-type: none"> <li>Does the school have access to informed advice and consider safety guidance and risk assessments?</li> </ul> <p><b>8. Outdoor learning</b></p> <ul style="list-style-type: none"> <li>Are the school's outdoor spaces and the local environment being used as a learning resource for all science topics?</li> </ul>	<p><b>1. Subject Leader development</b></p> <ul style="list-style-type: none"> <li>Does the subject leader have time allocated to the role?</li> <li>Does the subject leader have access to relevant CPD?</li> <li>Has the subject leader taken part in the PSQM CPD programme?</li> <li>Is the subject leader aware of PSTT Fellows and any science clusters in their locality?</li> </ul> <p><b>2. Supporting colleagues</b></p> <ul style="list-style-type: none"> <li>Do teachers have access to advice from the subject leader and to relevant CPD?</li> </ul> <p><b>3. Monitoring teaching and learning</b></p> <ul style="list-style-type: none"> <li>Does the subject leader review teaching and pupil progress across the school?</li> </ul> <p><b>4. Resourcing science</b></p> <ul style="list-style-type: none"> <li>Do children have a range of suitable equipment for practical science?</li> <li>Does the subject leader access funding from external sources to support science?</li> </ul> <p><b>5. Curriculum enrichment</b></p> <ul style="list-style-type: none"> <li>Does the curriculum link science to real world applications?</li> <li>Does the curriculum link science to your locality?</li> <li>Do children learn about the nature of science and the way scientists work?</li> <li>Does the curriculum support the development of science capital?</li> </ul>	<p><b>1. Science clubs</b></p> <ul style="list-style-type: none"> <li>Do children have the opportunity to join a science club?</li> </ul> <p><b>2. Science competitions</b></p> <ul style="list-style-type: none"> <li>Do children take part in local and national science competitions and citizen science surveys?</li> </ul> <p><b>3. Science visits</b></p> <ul style="list-style-type: none"> <li>Do children experience science outside school?</li> </ul> <p><b>4. Science events</b></p> <ul style="list-style-type: none"> <li>Do children take part in school, local or national science events?</li> </ul> <p><b>5. Wider community</b></p> <ul style="list-style-type: none"> <li>Do children share science with parents, e.g. family learning nights, interactive homework?</li> <li>Do children work with community groups, e.g. in local parks?</li> <li>Does the school publicise its science, e.g. on its website or email newsletters?</li> </ul>

Use the questions in the Subject Leader Evaluation Tool to help you assess what is working well in your school and what needs to be developed.

To find out what is happening across the school, you may decide to organise a staff meeting or talk to your colleagues individually.

To answer some questions, you may need to arrange time out of class to observe teaching, look at books and displays and talk to children.

The **Raising the Profile of Science** section (the pink boxes) is grouped into five areas. Guidance for developing each of these areas is described in this document.

# Raising the Profile of Science

## 1. Science Clubs

### Do children have the opportunity to join a science club?

Science clubs in primary schools can be run a number of different ways and there are resources available to support teachers running science clubs. A useful starting point is PSTT's CPD Unit, [Science Clubs](#), which outlines the benefits of running a science club, shares experiences of science club leaders and introduces [CREST Awards](#).

You may also be interested in the [PSTT & Children's University Science and STEM Clubs](#) aimed at teachers or other adults looking for support to introduce a primary science or STEM club. These club packs are all free to download and each provides 8 standalone sessions to use with clubs:

- **Engineering Our World** club introduces 8 famous scientists, engineers and artists as a springboard for group-based engineering challenges and is suitable for children aged 7-11.
- **Sensory Sparks** club provides activities aimed specifically towards children with special needs.
- **Challenge Chasers** club provides 8 science activities presented as challenges to solve for children aged 7-11.
- **Earth Explorers** club aims to develop environmental awareness through activities and is suitable for children aged 5-7.
- **Eco Science** club provides eight activities related to recent research about the environment and climate and is suitable for children aged 7-11.

PSTT continues to develop club resources; several new packs are currently in development.

## 2. Science competitions

### Do children take part in local and national science competitions and citizen science surveys?

Many organisations run regional and national competitions which can be exciting for primary children to take part in. This list below offers some examples but it is by no means exhaustive:

- The Royal Entomological Society supported by a number of partner organisations, organises 'Insect Week'. There are many types of activities relating to insects including art workshops, bug hunts and school visits. Find out more at [www.insectweek.org](http://www.insectweek.org).
- The [BioArtAttack\(2D\) competition](#), formerly the Nancy Rothwell Award, organised by the Royal Society of Biology, celebrates specimen drawing in schools and highlights the benefits of combining art and science. There is a category for children aged 7-11.
- The [Special Species Competition](#), organised by the Linnean Society, asks children to create a new species and is suitable for all age groups.
- The [FIRST® LEGO® League](#), organised by the Institute of Engineering and Technology, provides hands-on STEM experiences for children aged 4-16 years. To take part, schools will need Lego® kits which can be expensive. However, there are a number of funding packages available for educational settings, home schoolers and youth groups.
- The 'Great Exhibition at Home' is an engineering challenge for children aged 7-14 organised by [Big Ideas](#) and supported by The Royal Academy of Engineering.
- The [Primary Engineer](#) Leader's Award asks children to consider, 'If you were an engineer, what would you do?' and submit their designs in this annual competition.

## 3. Science visits

### Do children experience science outside school?

Across the UK, there are over fifty science and discovery centres and museums that work with researchers from local universities and industry to provide opportunities for school children to 'meet the experts', attend curriculum-based workshops and careers events, and become involved in large-scale experiments. These centres employ over 5000 professional science engagement specialists, who have the skills to create and deliver fun and engaging activities for all parts of society. A list of science centres can be accessed [here](#). There may also be smaller museums in your region, as well as nature reserves or parks which you could visit.

However, we know that there are many challenges in getting a class of primary children out of school: an already packed timetable, time consuming form-filling and cost. Many UK science centres charge entry fees (except for the national museums) but, even if entry were free, the cost of transport to the centres can be prohibitively high.

If you are unable to arrange a visit to a science-based museum, you can still take science learning outside and we recommend that you do. Further suggestions for outdoor learning are given in the document *Guidance for Subject Leaders: Whole School Approach*, in section 8.

You might consider inviting a science 'expert' into the classroom through the [STEM Ambassador scheme](#) and the use of local experts (including parents).

The following resources enable teachers to introduce science 'experts' in the classroom remotely:

- PSTT's [Science At Work](#) provides videos of present-day and historic scientists and engineers talking about their work and answering questions submitted by children.
- PSTT's [I bet you didn't know...](#) articles and teacher guides introduce the work of contemporary scientists in language that children can understand and describe investigations which children can carry out to mirror cutting-edge research.
- PSTT's [A Scientist Just Like Me](#) is a series of short slideshows introducing children to a diverse range of scientists and people who work in science-related jobs.
- [Facetime a Farmer](#), offers free fortnightly video calls between farmers and classrooms (organised by LEAF Education).

## 4. Science events

### Do children take part in school, local or national science events?

#### ***A Science Day or a Science Week***

You will need to plan for this at least a term before the event: talk to senior management about any changes to the regular timetable, agree a budget, apply for funding from external organisations, invite any external providers, and share your ideas with staff so that they understand the purpose of the event and what is required from them. You could choose a theme for the whole school to follow. Children might carry out investigations with their own class teacher, or you might arrange a special timetable which allows children to visit different teachers and carry out several different practical activities during the day/week. Children could stay with their own class or you might decide to create mixed-age groups. The choice is up to you. The following list of questions are intended to help you to think about the different options and assist with planning for a science event:

- Will you work with other local primary or secondary schools to share resources and ideas?
- How will the regular timetable change? Do you need to inform mealtime supervisors of any changes to using the hall?
- Will you have a whole school assembly to launch the event?
- Will you invite external providers?
- Will the older children run any activities?
- Will you ask staff to plan their own science activities or will you provide a list of activities?
- How will you use the outdoor spaces?
- Will you have a celebration assembly at the end to share the children's experiences? Will parents be invited to this?
- How might you share the outcomes of the science event with a wider audience? For example, will you use the school website, the school newsletter, or invite the local press?

British Science Week is a ten-day celebration of STEM subjects that is usually held in March. It is coordinated by the British Science Association (BSA) and is funded by the Department for Business, Energy and Industrial Strategy (BEIS). You may want to organise your school science week to coincide with this but you could organise your event at any time. British Science Week provides free activity packs suitable for children under 5 years old and children between 5 and 11 years old, a citizen science competition, advice on publicising your event, finding speakers, presenters and

volunteers, and information about a series of grants for funding your event. You can read more about organising Science Days in an article written by PSTT Fellows in ASE's [\*Journal of Emergent Science\* \(2019\) Issue 17, p45-49](#).

### **A Science Fair**

A Science Fair can be a stand-alone event or part of a Science Week. It can be an event that showcases children's work or an event that provides hands-on practical activities led by children for visitors to try.

Whichever type of Science Fair you plan, there are some questions that you will need to consider in advance. Here are some questions to support your planning of the event:

- Will all the children take part or will it be optional?
- Will the children present individually, in small groups or as a class?
- Will there be a theme or will you invite children to share something of their choosing?
- Who will remind the children/teachers to have their work ready on time? You might need to keep reminding children and staff about the event via School Council, assemblies and staff meetings.
- Where will the event take place? For example, will it be inside or outside? Is your school hall big enough?
- Will there be a guide showing where different stalls are located?
- Will visitors be asked to follow a one-way system to visit the stalls?
- Who will organise tables, positions and display boards?
- Who will you invite to attend? For example, each class could have a period to showcase their work to the rest of the school, or you might invite parents/carers to come.
- How will you publicise the event? For example, will it be in the school newsletter, the school website, social media, or the press.
- Will children receive certificates for taking part?

If the Science Fair is to showcase children's work, you may also want to consider these questions:

- Will the children carry out their investigations and prepare what they will present at school or at home? For example, will staff provide time in science lessons or will teachers set home learning projects?
- If children are carrying out their investigations or preparing their presentations at home, how will you make sure that they all have access to the equipment they might need?



If the Science Fair is to present hands-on activities, you may want to consider these questions:

- Will the stall holders explaining the activities be from just one year group, from the science club or from across the school?
- How could younger children be supported to be facilitators?
- Will you provide instructions for each activity?
- Will you train your facilitators?

The [Great Science Share for Schools](#) (GSSfS) is an annual campaign that encourages children to share their science questions with new audiences. The website also provides resources to support teachers in holding a GSSfS event. This event runs each June and children are encouraged to explore their own science questions and then share their findings using practical resources, becoming 'teachers' to other pupils.

Useful resources for project ideas:

- PSTT's [Why&How Magazine](#) contains a regular pull-out feature (The Why&How Challenge) which could be used as a class or whole school challenge
- [PSTT's Science Fun At Home](#) - simple activities using household resources
- [PSTT's Science For One](#) - activities based around one easy to obtain resource
- [PSTT's Science and STEM club packs](#)
- [PSTT's Learning Science Together](#) - activities for children and parents to do together at a school event
- [Practical Action STEM Challenges](#)
- [CREST Awards](#)
- [British Science Week activity packs](#)
- [Wow Science](#) contains links to organisations that promote science investigations that children can carry out at home

### **A Science Reading Challenge**

A Science Reading Challenge within the school setting, where the focus is reading science books for pleasure and is not too teacher-directed, can show children that science reading can be interesting and fun. To find out more about the benefits for children and how to organise a Science Reading Challenge in your school, visit the PSTT's [Science Reading Challenge](#) resource. You can download ideas for possible launch events and activities. You can also download bookmarks, passports and certificates.

## **An Inter-school Science Challenge**

You may be able to work with other primary schools in your locality to organise a science/STEM challenge. The event could be a one-day event when children from different primary schools work together to solve a science/STEM challenge.

Alternatively, the children might work on a challenge in their own school over several weeks (perhaps just one year group working on a project in their science lessons or a mixed age group in a science club) and then meet at an inter-school event to share their work and develop it further. It might be worth approaching a local secondary school to see whether any of their pupils would be able to support your primary children with their activities, and whether they could host this event.

Resources that could support an inter-school science challenge:

- [PSTT's Chain Reaction project](#)

## **A Citizen Science Project**

Citizen science is scientific research conducted in whole or in part, by amateur scientists. Several organisations organise citizen science projects that primary children can take part in. The following is a list of some suitable projects for primary age children, but is by no means exhaustive:

- [Zooniverse](#) is the world's largest platform for people-powered research. It lists several research projects but not all will be suitable for primary children. You will need to decide what is suitable for your children.
- PSTT's [Air Pollution Research](#) resource provides support for primary school children, their teachers, parents and other stakeholders to learn about and carry out investigations into air pollutants is a great starting point for a citizen science project.
- The [Garden Bird Watch](#) organised by The British Trust for Ornithology since 1995, asks people to keep a simple list of the species of birds that visit their garden, to understand how and why populations of garden birds are changing.
- The [Big Butterfly Count](#) organised by the charity Butterfly Conservation since 2010, is a nationwide survey of butterflies each summer to assess the health of the environment.
- [Open Air Laboratories \(OPAL\)](#), founded by Imperial College London in 2007, organise UK-wide citizen science projects suitable for all ages.
- The [Natural History Museum](#) has projects and downloadable resources to enable you to set up your citizen science project
- [Dark Sky Meter](#) is a project investigating the effects of light pollution and might be suitable for children aged 6-10 years.

## 5. Wider community

### Do children share science with parents, e.g. family learning nights, interactive homework?

There are several ways to engage parents and carers with children's science learning:

- Teachers could send home science challenges – for ideas see PSTT's [Science Fun at Home](#).
- Invite parents/carers to a Science Day or Science Fair – suggestions for organising science events are given in the previous section of this document.
- Involve parents in a whole school Science Reading Challenge – for further information, visit PSTT's [Science Reading Challenge](#) resource.
- Invite parents and children to come to school together to learn science through problem solving and investigative activities. PSTT's [Learning Science Together](#) provides everything that you need to do this in your own school.
- Consider creating a central science display in school, something that visitors may see that includes examples of science from across the school.

### Do children work with community groups, e.g., in local parks?

PSTT's [Garden Watch](#) encourages children to identify wildlife in their communities, understand why it's there and get hands-on to nurture it. This resource includes class presentations, explanatory letters for parents, promotional flyers and survey activity books.

### Does the school publicise its science, e.g., on its website or email newsletters?

Consider how your school shares the children's achievements in science. There are lots of ways that you could publicise what is going on in regular science lessons, science clubs and science events:

- Does the school website have a science section?
- Does the school website celebrate what each class is learning and is science included in this?
- Does the school newsletter share children's science learning and publicise science events that will happen/have happened in school or even notable external science events? For example, would you mention when there is an eclipse of the moon, or a sighting of a comet?
- Does the school use social media to advertise events?
- Are science events published in the local newspaper?