

Teaching Primary Science Outdoors

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Materials

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'Teaching Primary Science
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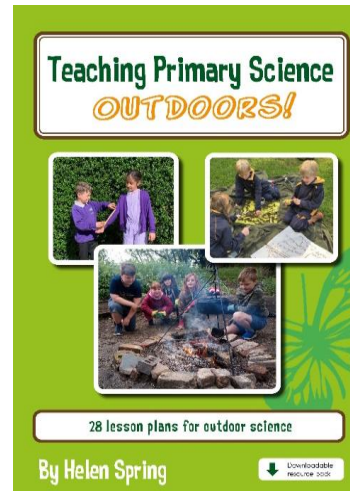
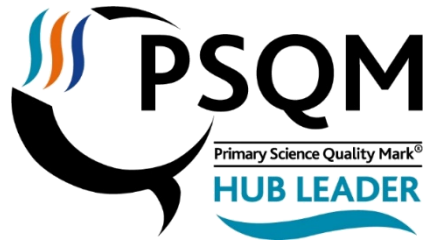
Teaching science outdoors in your school?

- What is going well?
- What challenges do you face?
- What questions do you have?

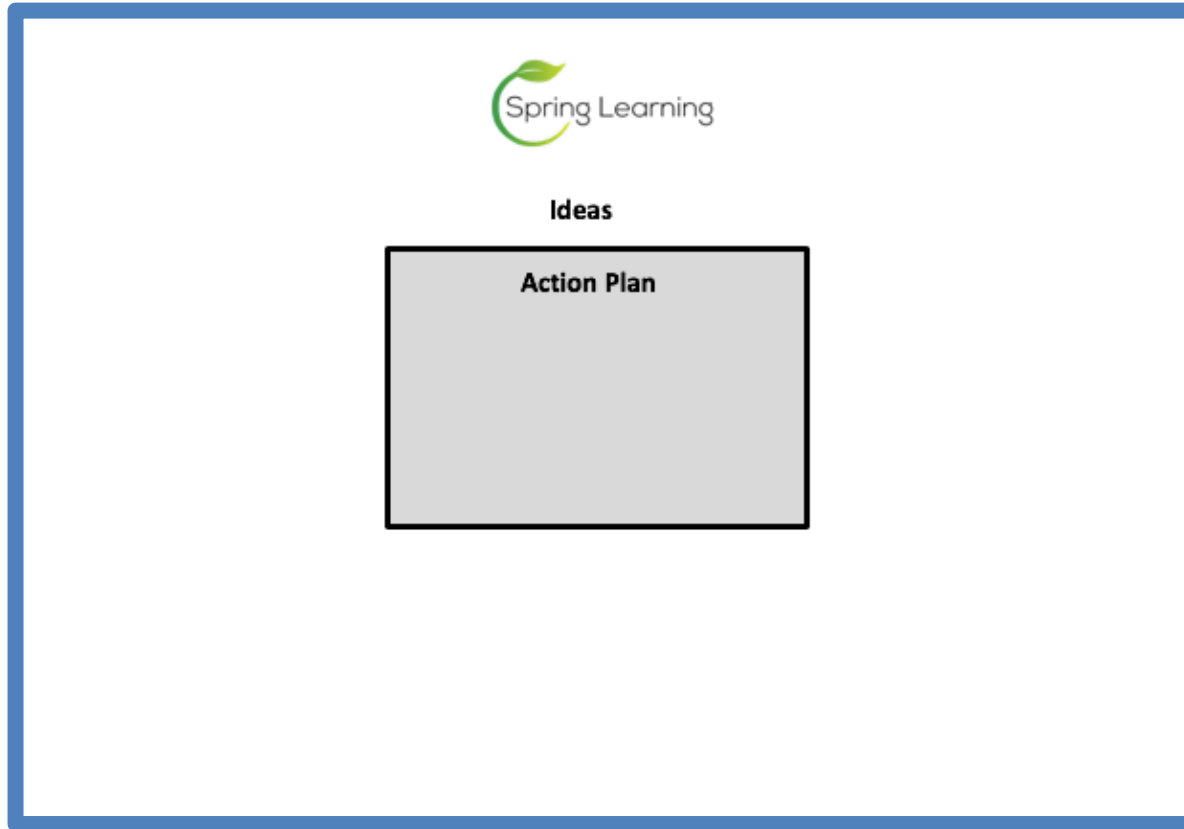
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CPD MARK
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Action planning



What is Outdoor Learning?

Learning Outside the Classroom (LOtC) is the use of places other than the classroom for teaching and learning. It is about getting children and young people out and about, providing them with challenging, exciting and different experiences to help them learn.



Council for Learning Outside the Classroom

Outdoor learning is that which takes place beyond the four walls of the traditional classroom environment.

Association for Science Education (ASE)



Why go outside anyway?



5 Characteristics of Effective Outdoor Learning

1. one that supports children in making the transitions from within the classroom to beyond it
2. one where there is both regular and frequent use of the outdoor setting.
3. fully prepares children for working in the outdoors by addressing the basic psychological and physiological needs of the children before leaving the classroom
4. the teachers manage the transition back to the classroom as consciously as they manage the move to the outdoor setting
5. a shift to weaker framing

HOATH, L. (2015).

5 Types of Enquiry



ReachOut
CPD

enquiring
science⁴all

5 Types of Enquiry in EYFS

Science in EYFS

ELG: The Natural World

Children at the expected level of development will:

- Explore the natural world around them, making observations and drawing pictures of animals and plants;
- Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class;
- Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.



Progression in Working Scientifically

‘KS1 - pupils should be helped to develop their understanding of scientific ideas by using different types of scientific enquiry to answer their own questions, including observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests and finding things out using secondary sources of information.’

Science programme of study 2014



Progression in Working Scientifically

‘LKS2 - Pupils should ask their own questions about what they observe and make some decisions about which types of scientific enquiry are likely to be the best ways of answering them, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative and fair tests and finding things out using secondary sources of information.’

Science programme of study 2014



Progression in Working Scientifically

‘UKS2 – Pupils should select the most appropriate ways to answer science questions using different types of scientific enquiry to answer their own questions, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information.’

Science programme of study 2014



The 5 types of enquiry outdoors....

- Comparative and fair testing – How does the length of time we exercise for affect our heart rate? (taken from [Ogden Trust](#), 'Developing Children's skills in Fair Testing')
- Research using secondary sources – iPad apps – Pl@ntnet
- Observing over time – observe the changes across the four seasons.
- Pattern seeking – What colour flowers do pollinating insects prefer? (taken from [Ogden Trust](#), 'Develop Children's skills in Pattern Seeking')
- Identifying, classifying and grouping – leaves, trees, fungi, flowers, minibeasts, rocks, materials....

Evolution and inheritance



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Taking technology outdoors



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Modelling

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Health & Safety in Primary Science...

CLEAPPS www.cleapss.org.uk

There is an annual password which can be found on the latest newsletter. Email membership@cleapss.org.uk to check if you are a member.



Be Safe book www.ase.org.uk



Any advice given by your LA must be considered

Risk Assessment

What are the hazards? What could happen? Please list	Who is at risk?	Current Control Measures in Place	Further action required to reduce risk to an acceptable level	Action by whom	Action by when
Natural and manmade obstacles (trees, ropes etc) – leading to injury	all		Children to be supervised Education Officer to dynamically risk assess the site and any new obstacles created before children are allowed to use them.	Group leaders Helen	At event
Tree climbing – fall leading to injury	all		Children to be supervised Tell children to climb no higher than 2 metres (Helen's insurance)	Group leaders Helen	At event
Rope swings - fall	all	Helen to take down any rope swings which appear unsafe Children not allowed to use the fixed rope swing over the river	Group leaders to supervise Helen to dynamically risk assess the putting up of any new rope swings	Group leaders Helen	At event

Activity - Exploring materials for a pixie house

Before lesson - check for litter especially near bench

Resources needed

In an ideal world, this lesson would take place in a forest area, where there are lots of sticks, leaves and other natural materials around. Additional materials should include different types of cloth (cotton, felt, etc.), plastic carrier bags or cling film, cardboard and paper towel.

What to do

*John to work with TA
Take Abby's epi pen (wasps)*

Prepare the materials you want the children to work with.

Discuss what children already know about the materials available to them.

Explain your health and safety rules. These might include the area that the children are allowed to work in and the things they can and cannot pick up.

If possible, put the lesson into a context, such as a story or topic.

Set the task – Can you make a house for a pixie? Discuss what the requirements are for your pixie... Does the pixie need to be warm, dry, protected from predators? You can adapt this depending on the context and the materials available.

Give the children time to explore with the materials available to them and to build a shelter for their pixie.

Children should then carry out simple tests to find out whether the requirements set were met. This is likely to include whether the pixie house is waterproof, warm or windproof.

Ensure that children wash their hands thoroughly after working outdoors.

Go from the fence to the wall. Do not pick the orange berries.

Definitely outdoors....

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Could be outdoors....

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Planning for Outdoor Learning

- Take a copy of the curriculum
- Highlight the obvious opportunities for outdoor learning in your year group (eg – identifying trees)
- In a different colour, highlight the less obvious opportunities for outdoor learning
- Choose one objective and plan how you will teach it outdoors.
What barriers need to be overcome in your context?

Planning to teach science outdoors

Plants – Year 3

Pupils should be taught to:

- identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers
- explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant
- investigate the way in which water is transported within plants
- explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal

Planning to teach science outdoors

Animals, including humans – Year 1

Pupils should be taught to:

- identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals
- identify and name a variety of common animals that are carnivores, herbivores and omnivores
- describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets)
- identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense

Assessment

- A range of approaches for assessing Working Scientifically (PLAN Assessment and PSTT TAPS)
- A range of approaches for assessing Conceptual Understanding (PLAN Assessment)
- A good tracking system

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YEAR 3 SCIENCE ASSESSMENT RECORD								
To judge that a pupil is working at the expected standard in science, teachers need to have evidence which demonstrates that the pupil meets all of the 'working scientifically' statements and all of the 'science content' taught in the final year of the key stage. Where possible, teachers should draw on assessments that have been made earlier in the key stage to make their judgement against this framework.								
	name	name	name	name	name	name	name	name
Working Scientifically: working at the expected standard (LKS2 NC requirements)								
asking relevant questions and using different types of scientific enquiries to answer them								
setting up simple practical enquiries, comparative and fair tests								
making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers								
gathering, recording, classifying and presenting data in a variety of ways to help in answering questions								
recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables								
reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions								
using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions								
identifying differences, similarities or changes related to simple scientific ideas and processes								
using straightforward scientific evidence to answer questions or to support their findings								
Science Content: working at the expected standard (Y3 NC requirements)								
identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers (Y3 Plants)								
explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant (Y3 Plants)								
investigate the way in which water is transported within plants (Y3 Plants)								
explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal (Y3 Plants)								

Assessing Conceptual Understanding



Assessing Working Scientifically



Primary science enquiry outdoors



Learning outdoors is a key part of primary science. The Teacher Assessment in Primary Science (TAPS) project has created a wide range of activities to support Working Scientifically. Many of these can take place outside and examples are listed below, with hyperlinks directly to the TAPS plan.

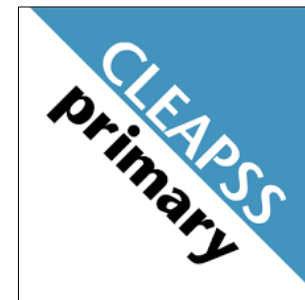
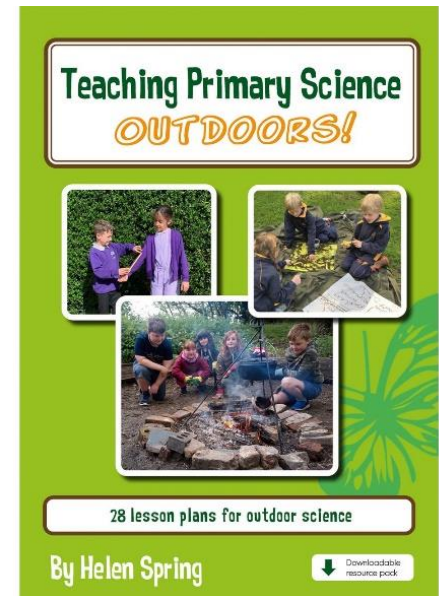
	Possible skills focus	Examples of science learning which can be done outdoors	Examples of science learning about the outdoors
Age 4-7	<ul style="list-style-type: none"> - Ask questions - Perform simple tests - Observe closely - Gather and record data to answer Qs - Identify and classify 	<p>How could we make the best shelter? Incy spider shelter R</p> <p>What happens to the ice? Frozen balloons R</p> <p>Which materials can we see light through? Transparency Y1</p> <p>Which objects do we think will float/sink? Float & sink Y1</p> <p>Which material made the best boat? Boat materials Y2</p> <p>How do we get the character out of the ice? Ice escape Y2</p> <p>What materials can we find? Materials hunt Y2</p> <p>How do we test which material is the most waterproof? Waterproof Y2</p>	<p>How can we sort the things we have found? Scavenger sort R</p> <p>Do all leaves look the same? Leaf look Y1</p> <p>What parts does this plant have? Plant structure Y1</p> <p>What colours/shades can we find? Shades of colour Y1</p> <p>What season is it now? Seasonal change Y1</p> <p>What does a plant need to keep healthy? Plant growth Y2</p> <p>What living things can we find nearby? Nature spotters Y2</p> <p>Is this alive? Has this ever been alive? Living & non-living Y2</p> <p>How many daisies are in each area? Daisy footprints Y2</p> <p>Where do woodlice live? Woodlice habitats Y2</p>
Age 7-11	<ul style="list-style-type: none"> - Plan different types of enquiry to answer Qs - Take measurements - Gather, record and classify data - Report findings - Use results to draw simple conclusions - Evaluate degree of trust in results 	<p>Which kind of materials make shadows? Making shadows Y3</p> <p>Which rock is the most hard-wearing? Rocks report Y3</p> <p>How can we package the egg? Egg drop Y3</p> <p>Which area is hottest/coldest? Adapt Measuring temp Y4</p> <p>How do we find out the best conditions for drying? Drying Y4</p> <p>Which is the best material for the job? Adapt Champion tapes Y5</p> <p>How can we compare our planes? Paper planes Y5</p> <p>How far can we make a spinner travel? Spinners Y5 (link to seed dispersal)</p>	<p>How much water do plants need? Measuring plants Y3</p> <p>How can we help our local environment? Eco action Y3</p> <p>What living things can we find? Local survey Y4</p> <p>Making a classification key for our area, e.g. Outdoor keys Y6</p> <p>Plus:</p> <p>Woodland Trust spotter sheets and activities</p> <p>Growing plants website guide for each month of the year</p> <p>Dr Katherine Forsey's detailed plans for pond/bush/minibeast/rock pool hunts</p>

The full set of enquiry lesson plans can be found under the 'Focused Assessment plans' tab, including many others which could take place outdoors:

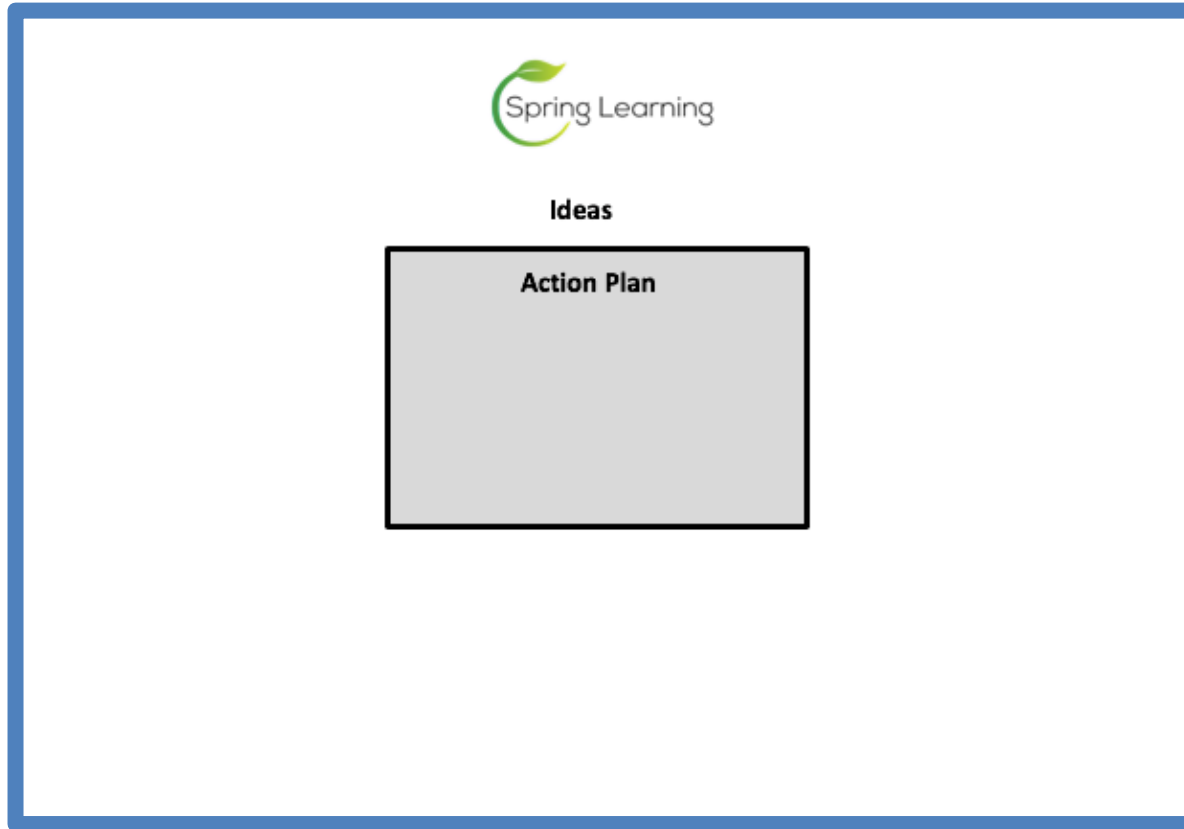
<https://pstt.org.uk/resources/curriculum-materials/assessment>

The majority of plans can be adapted for any age group or situation, so the above are only suggestions.

Resources to support outdoor learning and science



Action planning



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