Using moderation to establish priorities in primary science

Kate Redhead, Regional Mentor @RedPSTT Kate.Redhead@PSTT.org.uk

Overview

- Why moderate and why science?
- What are the options?
- Where should I start?
- What about my findings?
- Supporting tools.
- Time for questions.

Why moderate?

"Moderation is a **crucial part of teacher assessment**. It allows teachers to benchmark their judgements, while helping to ensure that **standards are consistent and outcomes are reliable**.

Schools should ensure that their teacher assessment judgements are moderated internally and, where possible, with other schools. This will quality-assure their judgements and provide a valuable opportunity for professional development."

Why moderate and why science?

- Making sure our assessments are accurate:
 - Judgements are consistent
 - Meet relevant standards
- Collaborating and establishing relationships:
 - Within school
 - With other schools
- Getting a full picture to establish priorities:
 - Understanding the curriculum
 - Progression
 - Areas of strength and improvement

Making sure assessments are accurate

- Allows teachers to understand where children are at the start of a topic, inform responsive teaching and allow the effective planning of next steps.
- Allows children to take ownership of their learning and respond to feedback.

"Assessment should be viewed as a tool for improving teaching and learning rather than simply measuring outcomes. It's how you, your pupils and your school respond to this information that is important."

Teacher Assessment in Primary Science (TAPS)



EEF (2023) Improving Primary Science Guidance Report, p.27

Collaborating and establishing relationships

- Collaborating and establishing relationships:
 - Within school:
 - Year groups;
 - Phases
 - Whole school
 - With other schools:
 - Trusts
 - Networks
 - Partnerships
 - Federations

Getting a full picture

- Getting a full picture to establish priorities:
 - Developing a deeper understanding of the curriculum
 - Exploring progression
 - Establishing areas of strength and improvement



What are the options? Moderating within school Science leader from Selly Oak

Vedrosday



1.1(GW



4. I cean't that the butter fly sucks out the nutrients from it cacoon

day on strate and appear the process of the of the lo: To digestion. 28 2 starter- Odd One Out I think the tauge is the add or out because laste bude, Ithink the only one that has the deance out beause its the bounge that & you cur He orly or Ref. 053







Examples of Work

Max

Plants - Year 2









-	Year	2	Торіс	Plants			
Q	Focus of assessment (National Curriculum statements)						
and the second	 Observe and describe how seeds and bulbs grow into mature plants. 						
PLAN V	Description of activity						
	The children were asked to make	careful observational drawings o	f seeds and bulbs.				

8	EVIDENCE OF LEARNING	ASSESSMENT
Oral evidence	Examples of work	Knowledge
The bulbs already have shoots, whereas the seeds do not.		Working scientifically Max uses a magnifying glass to help him make close observations.

© PLAN 2020



PLAN	Year	2	Торіс	Plants			
	Focus of assessment (National Curriculum statements)						
	Observe and describe how seeds and bulbs grow into mature plants.						
	Description of activity						
	The children were shown images the odd one out.	of a sunflower seed, sunflower se	eedlings and an amaryllis bulb, and	asked to think about which was			

	ASSESSMENT	
Oral evidence	Examples of work	Knowledge
"The seed is the odd one out because it is not growing. You can already see the shoot coming out of the bulb. The seeds look like hats on the seedlings." Teacher observations	<image/>	Max notices the green shoot already coming out of the bulb. He also notices that the seed case has been pushed out of the ground by the seedling. Working scientifically

© PLAN 2020



	Overall summary
PLAN Planning for assessment	Secure

Max has made close observations of seeds and bulbs and can talk about them. He now knows from direct observation that seeds and bulbs do not need light to germinate but they do need some warmth. He has also observed how seedlings grow differently according to the light level. Through the year, he has observed a range of seeds and plants growing to maturity, although he is also aware that not all the seeds and bulbs that were planted had the right conditions to be healthy and survive.



Teacher assessment exemplifications

dneys

Exemplification: working at the expected standard

Title	Changing ideas about circulation	
Science content statement(s)	The pupil can name and describe the functions of the main parts of the digestive (year 4), musculoskeletal (year 3), and circulatory systems (year 6) and describe and compare different reproductive processes and life cycles in animals (year 5).	2 h
Working scientifically statement(s) (if applicable)	The pupil can, using appropriate scientific language from the national curriculum, describe and evaluate their own and others' scientific ideas related to topics in the national curriculum (including ideas that have changed over time), using evidence from a range of sources.	
Context	In this activity, pupils were asked to recall facts from their previous studies human body. They drew and labelled these on the outline of the human The teacher then demonstrated a heart dissection, and went on to ask pr carry out some research about the circulatory system, using books avail in the classroom. This focused on the heart, blood vessels and lungs. The were asked to present this information in a similar diagram, so that they compare the 2 versions.	Aun us what i Amerer year H math and you will find mouth
Comment	Using information from books, the pupil has presented what they have for themselves about the main parts of the circulatory system (heart, bi vessels, lungs), in comparison with ideas they held before, such as the p and relative size of the heart and lungs.	stomach 2
		The head is the head is a set of the head is a set



What are the options? Moderating across schools Science leader from central Birmingham

Moderation meetings always feel a little daunting, a little intimidating; after all, a group of professionals in your subject is scrutinising your books and judging your judgements!

However, the network is a safe space where colleagues support one another with ideas, celebrate what's going well and provide constructive comments on what can be done to enhance the learning experience of our pupils and the assessment experience of our teachers.

We use supporting documents including the PLAN exemplars and Knowledge Matrices and the National Curriculum, and we have professional dialogue of what work looks like at the various levels for each topic.

We always go away feeling assured and with ideas of where to go next.

Curriculum Coverage Tool

Science National curriculum Year 1	Term	Term	Term	Term	Term	Term
	1a	1b	Za	zb	3a	зb
Plants						
identify and name a variety of common wild and garden plants, including deciduous and evergreen trees						
identify and describe the basic structure of a variety of common flowering plants, including trees						
Animals including humans						
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						
Everyday Materials						
distinguish between an object and the material from which it is made						
identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock						
describe the simple physical properties of a variety of everyday materials						
compare and group together a variety of everyday materials on the basis of their simple physical properties						
Seasonal changes	-					
observe changes across the 4 seasons						
observe and describe weather associated with the seasons and how day length varies						
Working scientifically						
asking simple questions and recognising that they can be answered in different ways						
observing closely, using simple equipment						
performing simple tests						
identifying and classifying						
using their observations and ideas to suggest answers to questions						
gathering and recording data to help in answering questions						
Enquiry types			•			
Research						
Comparative / fair testing						
Identifying & classifying						
Pattern seeking						
Observing over time						
		1		1		



PLAN Knowledge Matrices

	Year	6	Торіс	Living things and their habitats
PLAN Planing for assessment	 Describe how living things are similarities and differences, in Give reasons for classifying p 	e classified into broad groups acco cluding micro-organisms, plants ar lants and animals based on specif	rding to common observable chara nd animals. ic characteristics.	cteristics and based on

	Prior learning		Future learning
•	Recognise that living things can be grouped in a variety of ways. (Y4 - Living things and their habitats)	٠	Differences between species. (KS3)
•	Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. (Y4 - Living things and their habitats)		
•	Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. (Y5 - Living things and their habitats)		
•	Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats)		

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE				
Show understanding of a concept using scientific vocabulary correctly				
Key learning	Possible evidence			
Living things can be formally grouped according to characteristics. Plants and animals are two main groups but there are other livings things that do not fit into these groups e.g. micro-organisms such as bacteria and yeast, and toadstools and mushrooms. Plants can make their own food whereas animals cannot. Animals can be divided into two main groups: those that have backbones (vertebrates); and those that do not (invertebrates). Vertebrates can be divided into five small groups: fish; amphibians; reptiles; birds; and mammals. Each group has common characteristics. Invertebrates can be divided into a number of groups, including insects, spiders, snails and worms. Plants can be divided broadly into two main groups: flowering plants; and non-flowering plants.	 Can give examples of animals in the five vertebrate groups and some of the invertebrate groups Can give the key characteristics of the five vertebrate groups and some invertebrate groups Can compare the characteristics of animals in different groups 			

PLAN Knowledge Matrices



Key vocabulary	 Can give examples of flowering and 				
Vertebrates, fish, amphibians, reptiles, birds, mammals, invertebrates, insects, spiders, snails, worms, flowering, non-flowering	non-flowering plants				
Common misconceptions					
Some children may think:					
all micro-organisms are harmful mushrooms are plants.					
Apply knowledge in familiar related contexts, including a range of enq	Apply knowledge in familiar related contexts, including a range of enquiries				
Activities	Possible evidence				
 Use secondary sources to learn about the formal classification system devised by Carl Linnaeus and why it is important. Use first-hand observation to identify characteristics shared by the animals in a group. Use secondary sources to research the characteristics of animals that belong to a group. Use information about the characteristics of an unknown animal or plant to assign it to a group. Classify plants and animals, presenting this in a range of ways e.g. Venn diagrams, Carroll diagrams and keys. 	 Can use classification materials to identify unknown plants and animals Can create classification keys for plants and animals Can give a number of characteristics that explain why an animal belongs to a particular group 				

What are the options? Moderating a strand of learning in a group Science leader from Learnington



PLAN Progression in Knowledge

National Curriculum statements in red are from other linked topics.

Plants

1 Idilito		
Birth to three	•	Explore natural materials, indoors and outside.
Nursery	•	Use all their senses in hands-on exploration of natural materials.
	•	Explore collections of materials with similar and/or different properties.
	•	Plant seeds and care for growing plants.
	•	Understand the key features of the life cycle of a plant and an animal.
	•	Begin to understand the need to respect and care for the natural environment and all living things.
Reception	•	Draw information from a simple map. (Reception – Living things and their habitats)
	•	Explore the natural world around them. (Reception – Living things and their habitats)
	•	Describe what they see, hear and feel whilst outside. (Reception – Living things and their habitats)
	•	Recognise some environments that are different to the one in which they live. (Reception – Living things and their habitats)
	•	Understand the effect of changing seasons on the natural world around them. (Reception – Seasonal changes)
Year 1	•	Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees.
	•	Identify and describe the basic structure of a variety of common flowering plants, including trees.
Year 2	•	Observe and describe how seeds and bulbs grow into mature plants.
	•	Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.
	•	Identify and name a variety of plants and animals in their habitats, including microhabitats. (Y2 - Living things and their habitats)
Year 3	•	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.
Year 4	•	Recognise that living things can be grouped in a variety of ways. (Y4 - Living things and their habitats)
	•	Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. (Y4 - Living
		things and their habitats)
	•	Recognise that environments can change and that this can sometimes pose dangers to living things. (Y4 - Living things and their habitats)
Year 5	•	Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats)
Year 6	•	Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and
		differences, including micro-organisms, plants and animals. (Y6 - Living things and their habitats)
	•	Give reasons for classifying plants and animals based on specific characteristics. (Y6 - Living things and their habitats)
Key Stage 3	•	Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including
		quantitative investigation of some dispersal mechanisms.

Working Scientifically Progression Tools



EYFS

KS1

Working Scientifically Progression

Statements taken from: Science programmes of study: National curriculum in England (2013) DFE, key stages 1 and 2. Statutory framework for the early years foundation stage (2021) DFE.

Lower KS2

Upper KS2

Working Scientifically Skills Progression



	(3-5 years)	(5-7 years)	(7-9 years)	(9-11 years)											
PLAN Ask questions,	Inten attentively and respond to what they becomit even at	ask simple questions and recognise that there are been as a second se	ask relevant questions and use different types	> plan different types of scientific enquiries	KS1	To ask scientific questions	To plan an enquiry	To observe closely	To take measurements	To gather/record results	To present results	To interpret results	To draw conclusions	To make a prediction	To evaluate an enquiry
make predictions, decide on the method and equipment	questions	answered in different ways	 b answer them set up simple practical enquiries, comparative and fair texts 	to answer question, including recognising and controlling variables where necessary	Classifying	Be able to ask a Yes/No questions to aid sorting	Identify the headings for the two groups (it is, it is not)	Be able to compare objects based on obvious, observable features e.g. size, shape, colour, texture etc.			Sort objects and living things into two group using a basic Venn diagram or simple table	Talk about the number of objects in each group i.e. which has more or less	Children in KS1 are not expected to draw conclusions. They are expected to make observations which will help them to answer	Children in KS1 are not expected to make scientific predictions as they do not have the subject knowledge to do this. That does not mean that	Children in KS1 are not expected evaluate. Howeve children should b encouraged to consider their method and adap this where
DO Carry out an enquiry using equipment	 show an ability to follow instructions involving several ideas or actions be confident to try new activities use a range of small 	 observe closely, using simple equipment perform simple texts identify and classify 	make systematic and careful observations and, where appropriate, take accurate measurements using standard units, one a	take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking receipt readions	Re se arching	Ask one or two simple questions linked to a topic					Present what they have learnt verbally or using pictures	Be able to answer their questions using simple sentences	questions. They do not have the subject knowledge to give reasons for what they observe so they cannot draw scientific conclusions.	you should not ask children what they think may happen, but this will be based on experience or may simply be a guess.	necessary.
RECORD	tools > safely use and explore a variety of materials, tools and techniques > explore the natural	> gather and record	range of equipment, including thermometers and data loggers > gather, record, classify	when appropriate	omparative/fair testing	Identify the question to investigate from a scenario or choose a question from a range provided	Choose equipment to use and decide what to do and what to observe or measure in order to answer the question	Make observations linked to answering the question	When appropriate, measure using standard units where all the numbers are marked on the scale	Record data in simple prepared tables, pictorially or by taking photographs	Present what they learnt verbally, using pictures or block diagrams	Answer their question in simple sentences using their observations or measurements			
Use drawings, tables or graphs to note observations and measurements	world around them, making observations and drawing pictures of animals and plants	data to help in answering questions	and present data in a variety of ways to help in answering questions > record findings using simple scientific language, drawings, labelled diagram, labelled diagram,	results of increasing complexity using scientific diagrams and labels, classification longs, tables, scatter graphs, bar and line graphs	Observing over Co time	Ask a question about what might happen in the future based on an observation				Record data in simple prepared tables, pictorially or by taking photographs	Present what they learnt verbally or using pictures				
REVIEW Interpret, communicate and evaluate results	 participate in discussions, offering their own ideas, using recently introduced vocabulary offer explanations for 	 use their observations and ideas to suggest answers to questions 	tables > report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions	 use text results to make predictions to set up further comparative and fair texts report and present 	Pattern seeking	Ask a question that is looking for a pattern based on observations				Record data in simple, prepared tables and tally charts	Present what they learnt verbally				
	why things might happen > express their ideas and feelings about their experiences > know some similarities and differences drawing on their experiences		 use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions identify differences, similarities or changes related to simple scientific ideas and processes use straightforward 												
			scientific evidence to answer questions or to support their findings		ģ										

Where should I start?

- Who to moderate with:
 - Year group partner
 - Phase colleagues
 - Whole school
 - Another school
 - A group of schools
- What to focus on:
 - Accuracy of assessments
 - An area you know is a strength/needing improvement
 - A particular strand of substantive knowledge
 - A science enquiry area
 - A particular working scientifically skill
 - Achieving a general picture



What I found	Possible Solutions	Where I want to get to	When will I check this?
Gaps in Y4 coverage			
Teachers over assessing in year 6			
Disciplinary knowledge not always evidenced			

What I found	Possible Solutions	Where I want to get to	When will I check this?
Gaps in Y4 coverage	Discussions with the y4 team, sharing analysis of gaps and the need to address them.	No gaps in coverage.	July
Teachers over assessing in year 6	Time with the year 6 team to assess a small selection of different abilities of children.	Teachers confident and accurate in assessments.	End of June
Disciplinary knowledge not always evidenced	Carry out a book look to establish more detail. Use this to plan CPD for coming year.	Clear evidence of disciplinary knowledge.	2024-25

Supporting tools

- PLAN exemplars examples of work
- Assessment exemplifications
- PLAN knowledge matrices
- PLAN progression in knowledge
- PSTT working scientifically progression
- PSEC working scientifically skills progression
- Ogden Trust moderation meeting guidance
- PLAN working scientifically matrices
- PLAN progression in vocabulary



For more information on the Primary Science Teaching Trust and access to a large selection of PSTT resources, visit our website:

www.pstt.org.uk





in /company/primary-science-teaching-trust

