



'Working scientifically' in primary science

Develop children's skills in identifying and classifying

Introduction

Children begin identifying and classifying objects in the world around them from a very young age; this type of enquiry comes very naturally as young learners try to make sense of the world around them. In this type of enquiry, children make observations and measurements to help them look for similarities and differences. This will help them to organise things into groups and make connections. Identifying and classifying enquiries are fantastic for promoting discussion and collaborative learning. In revisiting this type of enquiry regularly, teachers can support children in becoming more highly skilled in making and recording detailed observations.

Big questions

Here are some examples of 'big questions' that can be explored by identifying and classifying in KS1 and KS2. There is at least one for every area of the curriculum, so it is easy to plan opportunities for children to revisit this type of enquiry and develop their skills.



Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
How can we sort the leaves that we collected on our walk?	How can we identify the trees that we observed on our tree hunt?	How many different ways can you group our seed collection?	What are the names for all the organs involved in the digestive system?	Can you identify all the stages in the human life cycle?	How would you make a classification key for vertebrates/invertebrates or microorganisms?
How can we organise all the zoo animals?	Which offspring belongs to which animal?	How do the skeletons of different animals compare?	How can we organise teeth into groups?	Compare this collection of animals based on similarities and differences in their lifecycle.	Which organs of the body make up the circulation system, and where are they found?
What are the names for all the parts of our bodies?	How would you group these plants and animals based on what habitat you would find them in?	Can you use the identification key to find out the name of each of the rocks in your collection?	Can you group these materials and objects into solids, liquids, and gases?	Can you group these materials based on whether they are transparent or not?	Compare the skeletons of apes, humans, and Neanderthals – how are they similar, and how are they different?
How would you group these things based on which season you are most likely to see them in?	How would you group things to show which are living, dead, or have never been alive?	How would you organise these light sources into natural and artificial sources?	Can we use the classification keys to identify all the animals that we caught pond dipping?	How could you organise all the objects in the solar system into groups?	Can you classify these observations into evidence for the idea of evolution, and evidence against?
We need to choose a material to make an umbrella. Which materials are waterproof?	Which materials are shiny and which are dull?	How can we group the food that we eat?	How would you group these electrical devices based on where the electricity comes from?	Can you label and name all the forces acting on the objects in each of these situations?	Can you identify all the colours of light that make white light when mixed together? What colours do you get if you mix different colours of light together?
Which materials will float and which will sink?	Which materials will let electricity go through them, and which will not?	Which materials are magnetic?	How would you sort these objects/materials based on their temperature?	Can you observe and identify all the phases in the cycle of the Moon?	How would you group electrical components and appliances based on what electricity makes them do?

'Working scientifically' skills

In KS1, children will be asking questions about the similarities and differences between things, which is a great opportunity to promote 'talk for learning' and encourage children to share their ideas. This type of enquiry lends itself to going outside to explore the world around them at all times of the year.

Going into KS2, this type of enquiry is often moved to the side with an increased focus on measuring and using data to answer 'big questions'. However, it does need to be regularly revisited. Children should continue to build on their observational skills, becoming more independent in identifying, through the use of increasingly complex tools, as well as developing higher order skills in reasoning and justification when explaining how they have chosen to group things. KS2 pupils will be expected to design simple tests to help them classify materials, as well as independently using a range of secondary sources to support them in identifying a range of living things.



Resources

There is a range of equipment that schools will find useful to support enquiries in identifying and classifying:

Magnifying glasses	Binoculars	Microscope
Digital microscope	Plain paper	Digital cameras
Rulers	Clipboards	Identification keys
Post-it notes	Reference books to support identification	Access to the internet to support identification

Reporting learning

Identifying and classifying enquiries provide some of the best opportunities for children to make and record detailed observations. Younger children will be able to record what they see in the form of a drawing; the challenge for teachers is to scaffold these drawing opportunities so that, over their time in primary school, children become skilled in producing scientific drawings of their observations, increasing in fine detail as the years go on. For this to happen, children will need access to a variety of equipment that will support them in making closer observations; magnifying glasses, binoculars, telescopes, microscopes, and digital microscopes, will all help to develop children's skills in this area.

Scientific diagrams need labels, so this is a great type of enquiry in which to focus on scientific vocabulary. Developing useful vocabulary for children to use when identifying and classifying, as well as introducing new technical terms, is important. For children who find creating detailed drawings challenging, providing photographs of the objects that are being observed to label can be very helpful. As this type of enquiry includes classifying and grouping, it is also an ideal opportunity for children to apply mathematical skills in creating Venn and Carroll diagrams to organise their findings. As children progress through KS2, they should be learning identification keys to help them with this type of enquiry, as well as learning how to create their own branched key.

Additional information

Zooniverse is an online citizen science portal, with a wide range of projects that your pupils can get involved with, analysing photos, video and data to help real scientists with identification and classification of large quantities of data/observations. Children can hunt for chimpanzees in the forests of Africa using field guides to identify the animals they observe, or help the LIGO team hunt for gravitational waves. <https://www.zooniverse.org>



Planning

Curriculum Mapping

Attempt to identify a potential identifying and classifying enquiry in every science unit.

Aim for each class to revisit identifying and classifying five or six times over the academic year.

Plan to include scenarios where children get to suggest their own identifying and classifying enquiries.

Progression Planning

Using National Curriculum documents, map out Age Related Expectations (ARE) for identifying and classifying enquiries.

Establish age specific success criteria for identifying and classifying enquiries.

Develop a collection of exemplar outcomes to support consistent expectations (WAGOLL).

Resource Audit

Take stock of science resources, making a comprehensive list of items that would support this type of enquiry.

Provide teaching staff with a list of resources that their pupils should get the opportunity to use over the year.

Put procedures in place for teachers to alert senior leadership when resources are broken, faulty or missing.

Support and Challenge

Ensure that teachers are aware of ARE for the academic years before and after the one they are teaching.

Teachers develop support materials for children working below ARE in their class. Examples include classroom displays, writing frames or sentence starters

Teachers develop extension tasks for gifted and talented learners to extend their 'working scientifically' skills.

Quality Assurance

Review children's work to look for coverage of all enquiry types as well as progression and challenge across year groups.

Carry out a 'learning walk' while all classes focus on identifying and classifying enquiries – identify good practice and highlight areas for development.

Lead pupil voice work that focuses on 'working scientifically', exploring children's perceptions on experiences and levels of understanding.

Celebrate

Have a 'working scientifically' notice board with a display that changes to a new type of enquiry each half term.

Display high-quality examples of identifying and classifying enquiry work from each class and identify key features and progression.

As a special whole school focus, put in place a system of reward for individual success in 'working scientifically'.