MODULE 8 · SPONTANEOUS INQUIRY PLANNER

# Where do the colours in the sky come from at *sunrise and sunset?*

A spontaneous inquiry into the colours of the morning and evening sky, guided gently by the 5 Why's. It models how to grow a rich investigation from the curiosity of just three or four children, honour their first theories, and let their thinking travel towards a more scientifically truthful understanding, all without turning it into a whole-class lesson or disrupting your wider programme.

**Age** around 6 | **Group** 3–4 children (parallel inquiry) | **Duration** 1–2 weeks, flexible | **Threads** science · art · language · thinking

> *Not every spontaneous inquiry needs to become a whole-class inquiry. When thoughtfully designed, a small-group inquiry can remain visible, accessible and meaningful to the entire learning community, while preserving the ownership of the children whose curiosity began it.*

## The 5 Why's: our teacher-thinking structure

1. **Ask with curiosity.** Begin with the child's existing idea rather than correcting it.
2. **Probe the response and go deeper.** Ask why the child thinks that, and what makes them believe it.
3. **Gently challenge assumptions.** Offer an observation, a contrasting idea or evidence that complicates the first theory.
4. **Express interest and ask further.** Encourage children to make connections, explain relationships and raise new questions.
5. **Agree or disagree respectfully, and ask the final reflective question.** Help children see why their revised understanding matters, and how their thinking has changed.

WHAT IS INSIDE

1 **The spark & first theories** · the provocation and the children's honest ideas
2 **The parallel inquiry** · thinking wall, documentation, inviting the whole class in
3 **The 5 Why's in action** · suggested questions at each stage, and a map of thinking
4 **Investigations & experiences** · two flexible weeks of noticing, testing and revising
5 **Science, vocabulary & resources** · accurate, age-appropriate, introduced naturally
6 **Observation, assessment & reflection** · thinking that changes, not a worksheet

SECTION 1 · HONOURING THE CURIOSITY

# The spark, and the children's first theories

*Where the inquiry began, and the honest ideas worth keeping*

## THE SPONTANEOUS MOMENT

Late one afternoon the light through the window turns the classroom gold. Three or four children drift to the glass and stay there. "The sky is going orange!" one says. Another remembers a photograph from home; a third wonders aloud, *"Where do the colours come from?"* The question is not on any plan for the week, and only a handful of children are gripped by it. That is exactly the kind of moment this planner is built for. Rather than steering the whole class onto it, or letting it pass, the teacher names it: *"That is a brilliant wondering. Shall we find out?"* and a small inquiry is born.

**MISCONCEPTIONS ARE EVIDENCE OF THINKING**

Treat every first theory as valuable evidence of a child reasoning, not a mistake to be corrected on the spot. Write the theories down, in the child's own words, and keep them. They are the starting line we will measure the journey from, and children will take real pride in seeing how far their thinking has travelled.

## OUR FIRST THEORIES (DOCUMENTED IN THE CHILDREN'S WORDS)

*"The sun paints the sky."*

**Notice:** the sun is seen as the maker of colour; a lovely link between art and sky.

*"The clouds change colour."*

**Notice:** close observation; clouds really do light up, so this idea is partly true.

*"The sun gets hotter when it goes down."*

**Notice:** colour is linked to heat; a reasonable guess from everyday experience.

*"The sky has different colours inside it."*

**Notice:** the child senses the colours are somehow already there, close to the truth about light.

*"The rain makes the colours."*

**Notice:** water and colour are linked, a step towards rainbows and prisms.

*"The sun mixes with the clouds."*

**Notice:** an idea of combining or mixing; useful when we explore light meeting the air.

## A NOTE ON AGENCY

From here on, the teacher's job is not to deliver the answer. It is to help this group notice evidence, compare their ideas, and build a truer understanding for themselves. We never lead them to a fixed answer with closed questions; we open doors and let them walk through.

SECTION 2 · A SMALL GROUP, A VISIBLE THREAD

# Setting up the parallel inquiry

*The curious few own it; the whole class is always welcome in*

A parallel inquiry runs alongside your usual programme. The small group who asked the question become its owners: they gather the evidence, try the investigations and update the thinking. The rest of the class carry on with the week's learning, but the inquiry stays visible and open, so any child can look, wonder, add an idea, or join for a while and drift away again. Ownership stays with the children whose curiosity began it, while the learning enriches everyone.

## THE VISIBLE INQUIRY AREA (A THINKING WALL)

Give the inquiry a home: a low wall, a board or a floorbook the children can reach. Build it with them, not for them. Over the two weeks it holds:

- The big question, in the children's words.
- The first theories, each on its own card.
- Children's drawings and paintings of the sky.
- Photographs of sunrises and sunsets.
- Predictions made before each investigation.
- Evidence and what we noticed afterwards.
- New questions as they arise.
- Revised theories beside the first ones.

## INVITING THE WHOLE CLASS IN, WITHOUT REQUIRING THEM

The wider class should be able to contribute freely, and never be made to join:

- **A wondering pocket.** A pouch on the wall where any child can post a theory, question or drawing to add to the inquiry.
- **Share-circle updates.** The inquiry group reports back briefly; others may offer ideas or evidence, or simply listen.
- **An open invitation.** The investigation table stays set up at choosing time, so a child can try the torch or prism when curious.
- **Family evidence.** Anyone may bring a sunset photograph from home to pin to the wall.

## DOCUMENTATION STRATEGIES

- **A floorbook or inquiry journal** that grows with the group: dated entries, quotes and photographs.
- **Theory cards** in the child's own words, dated, so change over time is visible.
- **Before-and-after drawings** kept side by side.
- **Short transcribed conversations** capturing the reasoning, not just the conclusion.

SECTION 3 · QUESTIONS THAT OPEN THINKING

# The 5 Why's in action

*A teacher-thinking structure, not an interrogation, tuned to this inquiry*

### 1 Ask with curiosity

Begin with the child's existing idea. Make a warm space for it; do not correct.

TRY ASKING

*"What have you noticed about the sky? What colours did you see? What do you think is happening up there?"*

### 2 Probe the response and go deeper

Take their first theory and ask for the reasoning beneath it.

TRY ASKING

*"Why do you think the sun paints the sky? What makes you think that? How do you imagine it happens?"*

### 3 Gently challenge assumptions

Offer an observation or piece of evidence that complicates the theory, kindly and without judgement.

TRY ASKING

*"I wonder... if the sun paints the sky orange, why is it blue in the middle of the day? Yesterday there were no clouds, and the sky still turned pink, why might that be?"*

### 4 Express interest and ask further

Show genuine interest, and invite connections, relationships and new questions.

TRY ASKING

*"That is a fascinating idea. What does it remind you of? Where else have you seen colours appear in light? What could we try, to find out more?"*

### 5 Agree or disagree respectfully, and ask the final reflective question

Model changing your own mind, then draw out why the new understanding matters.

TRY ASKING

*"I used to think the sky was painted too; now I wonder about the light. Your thinking has changed, hasn't it? Why do you think it matters to know where the colours really come from? What do you understand now that you didn't before?"*

SECTION 3 · READING AND EXTENDING EACH THEORY

# A map of thinking

*For each first theory: what the child thinks, what you notice, what to ask, what to try, and the science that may begin to emerge*

| What the child thinks | What the teacher notices | What the teacher might ask next | Experience to extend | Science that may begin to emerge |
|---|---|---|---|---|
| "*The sun paints the sky.*" | The sun is the colour-maker; a link between art and sky. Agency and imagination. | "What does it paint with? Where does the paint go in the daytime? Why is the day sky blue?" | Paint skies freely. Shine a white torch onto paper, then through a cup of water. Look at the sky at noon and at sunset. | The colour lives in the light, it is not painted on. Light travels to us from the sun. |
| "*The clouds change colour.*" | Careful observation; clouds really do light up. Partly true, a good anchor. | "Do the colours come when there are no clouds too? What colour are clouds in the middle of the day?" | Photograph the sky at sunset with and without clouds. Shine a torch through cotton wool and tissue. | Clouds and water droplets catch and change the light, but the colour begins in the scattered sunlight. |
| "*The rain / water makes the colours.*" | Links water and colour; already close to rainbows and prisms. | "Why might water make colours? Have you seen colours in water before? When did that happen?" | Make a rainbow with a mirror in a bowl of water and a torch. Try a prism. Mist a spray bottle in sunlight. | Water can split white light into many colours; sunlight already contains them all. |
| "*The sun gets hotter when it goes down.*" | Colour linked to heat; sensible from daily life. A testable idea. | "Does the sky feel hotter at sunset? How could we check? What else changes as the sun goes down?" | Notice the sun sits low at sunset. Use a torch as a low "sun" shining a long way across the room through a little mist. | It is the long path of light through the air near sunset, not extra heat, that changes the colours. |

**KEEP THE THINKING OPEN**

The right-hand column is for the teacher, not a script for the children. Let understanding surface through what they notice and compare. A theory that is "partly true", like the clouds changing colour, is a gift: build on the truth in it rather than replacing it.

SECTION 4 · TWO FLEXIBLE WEEKS

# Investigations & experiences

*Notice, predict, test, revise, and draw as a way of thinking throughout*

## Week 1

*Noticing closely and gathering first theories*

- **Observe the real sky** at different times of day; talk about the colours and where the sun is.
- **Look at photographs** of sunrises and sunsets from around the world on the wall.
- **Paint and draw** what they see; painting is a way of thinking, not decoration.
- **Predict first:** "What do you think we'll see if we shine a torch through water?"
- **Torch and water** play; notice how light looks different coming through.
- **Record every theory** and prediction on the thinking wall.

## Week 2

*Testing, comparing and revising thinking*

- **Split white light** with a prism, or a mirror in water, to reveal the hidden colours.
- **Shine through translucent things** (tissue, cotton wool, frosted plastic) and compare.
- **The milk-and-water sunset** (see below): the key age-appropriate model.
- **Predict before each test,** then compare prediction with what happened.
- **Revisit the first theories;** place revised theories beside them.
- **Paint again** and compare with Week 1's paintings.

### The milk-and-water sunset (a model of the real thing)

Half-fill a clear tank or bottle with water and stir in a few drops of milk. Shine a strong white torch through it in a darkened room. From the **side**, the water glows faintly **blue**, like the daytime sky. Looking straight **through** the water towards the torch, the light turns **yellow, orange then red**, like a sunset. Add more water (a longer path) or a little more milk and the "sunset" deepens. Let the children predict, look, and say what they notice before any explanation is offered.

### DRAWING AND PAINTING AS FORMS OF THINKING

Keep paint, chalk and paper beside the inquiry throughout. Ask children to paint their theory, not just a pretty sky: "Show me where you think the colours come from." A painting often reveals a child's reasoning more honestly than words, and gives a clear before-and-after record of how their thinking changes.

SECTION 5 · ACCURATE, AND AGE-APPROPRIATE

# The science, unfolding gently

*True understanding, revealed a little at a time, never as a lecture*

## WHAT CHILDREN MAY COME TO UNDERSTAND

- Sunlight can look white, but it is really many colours mixed together.
- Light travels from the sun through the air around the Earth (the atmosphere).
- The air is full of tiny bits and pieces, far too small to see, that scatter the light in all directions.
- Blue light is scattered the most, so in the daytime the whole sky looks blue.
- At sunrise and sunset the sun is low, so its light travels through much more air to reach us.
- Along that long path most of the blue is scattered away, leaving the reds, oranges and pinks for us to see.
- Clouds, water droplets, dust and moisture can catch this light and change how the colours look.
- A prism or water can split white light into its colours, so children can see the hidden colours for themselves.

## VOCABULARY, INTRODUCED NATURALLY WHERE IT FITS

**light** **colour** **sunlight** **the air / atmosphere** **scatter** **reflection** **water droplets** **prism** **sunrise** **sunset**

Introduce each word in the moment a child needs it, not as a list to memorise. When the torchlight spreads through the milky water, that is the moment to offer the word *scatter*.

## BOOKS, IMAGES AND SHORT VIDEOS TO EXTEND THINKING

- **Picture books:** *Sky Color* by Peter H. Reynolds (a child works out how to paint a sky); *A Rainbow of My Own* by Don Freeman; a simple non-fiction title on light and rainbows.
- **Images:** a wall of sunrise and sunset photographs from different places and seasons; a daytime-blue-sky photo for comparison.
- **Short video:** a time-lapse of a sunset; a brief, child-friendly clip on why the sky is blue and sunsets are red. Watch, pause, and let the children do the explaining.

SECTION 6 · THINKING THAT CHANGES, NOT A WORKSHEET

# Observation, assessment & final reflection

*We assess the journey of a child's explanation, not a right answer on a page*

### WHAT TO LOOK FOR (ASSESSMENT)

- Does the child's explanation change as they gather evidence?
- Can they say why they now think differently?
- Do they use observation and prediction, not just guessing?
- Are new, sharper questions appearing?
- Can they hold a "partly true" idea and build on it?
- Do they use new vocabulary meaningfully, in the right moment?

### TEACHER OBSERVATION NOTES

Capture the reasoning, the surprising moments, and the exact words that show a theory shifting.

### COMPARING FIRST AND LATER THEORIES

#### A FIRST THEORY (WEEK 1)

"*The sun paints the sky.*"

"*The rain makes the colours.*"

#### A REVISED THEORY (WEEK 2)

"*The light from the sun has all the colours in it, and the air lets the orange ones come through when the sun is low.*"

"*Water can split the light up, like the sky does.*"

### FINAL REFLECTION, WITH THE CHILDREN

Gather the group at the thinking wall. Read the first theories aloud, then the latest ones. Ask: *"How has our thinking changed? What helped it change? What do you still wonder?"* Celebrate the distance travelled, and leave the wall open, because a good inquiry often sends children off with a new question rather than a full stop.

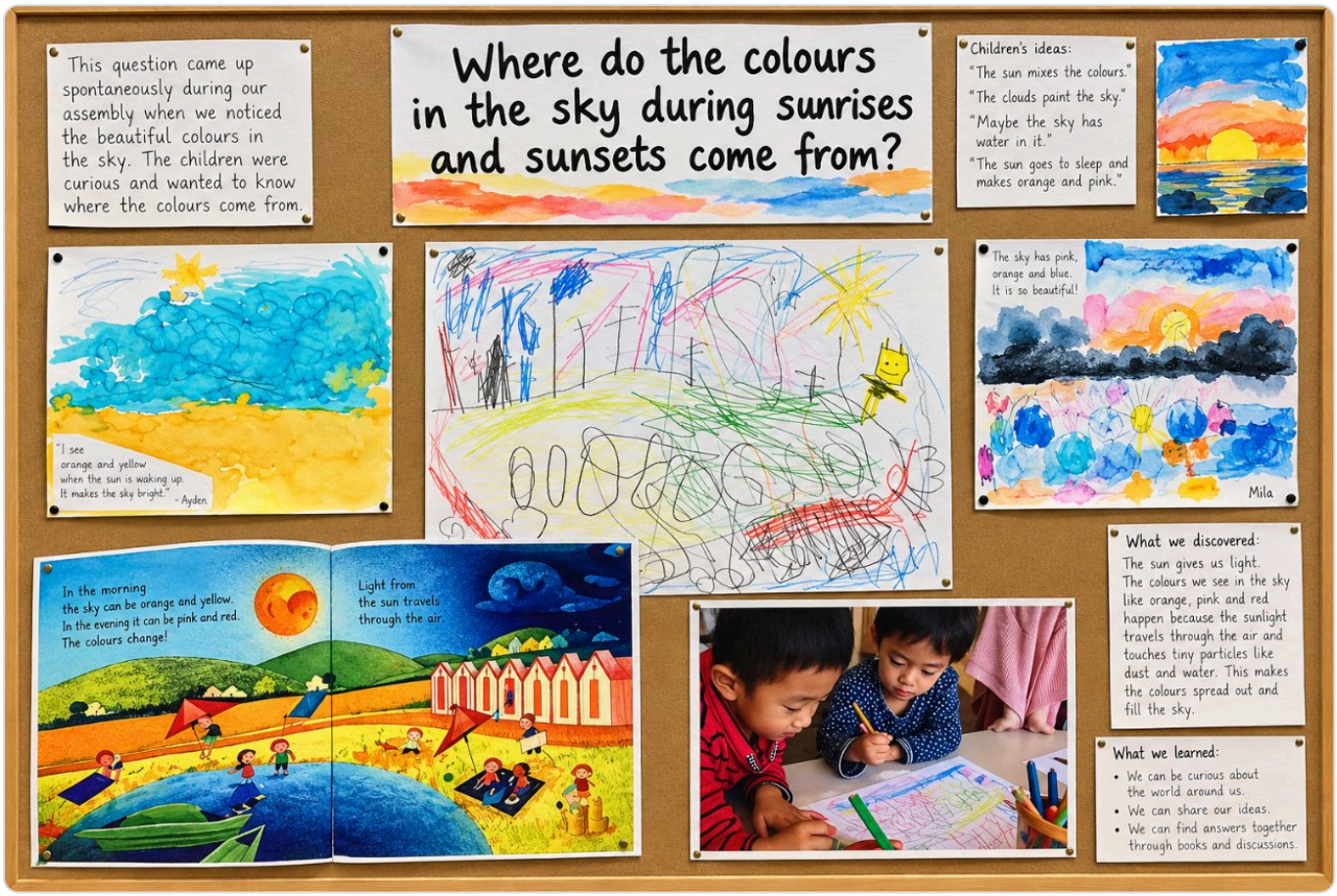
### HOW OUR THINKING CHANGED

### WHAT WE STILL WONDER (WHERE THIS MIGHT GO NEXT)

SECTION 6 · DOCUMENTING THE JOURNEY

# Make the thinking visible

*A worked example of documenting an authentic, spontaneous inquiry*




*A thinking wall built with the children: the big question, their first theories, their paintings, a photograph of the inquiry group at work, and what the class discovered and learned.*

> *Documenting the authentic learning journey matters, even when an inquiry is spontaneous and led by only three or four children. A visible display keeps their question, their first theories and their discoveries on show, honouring the children's ownership while inviting the whole class to follow, contribute and learn alongside them.*